A&B COMPUTING
FOR ACORN COMPUTERS

BBC MICRO · MASTER · ARCHIMEDES · ELECTRON

MAY 1988 £1.50

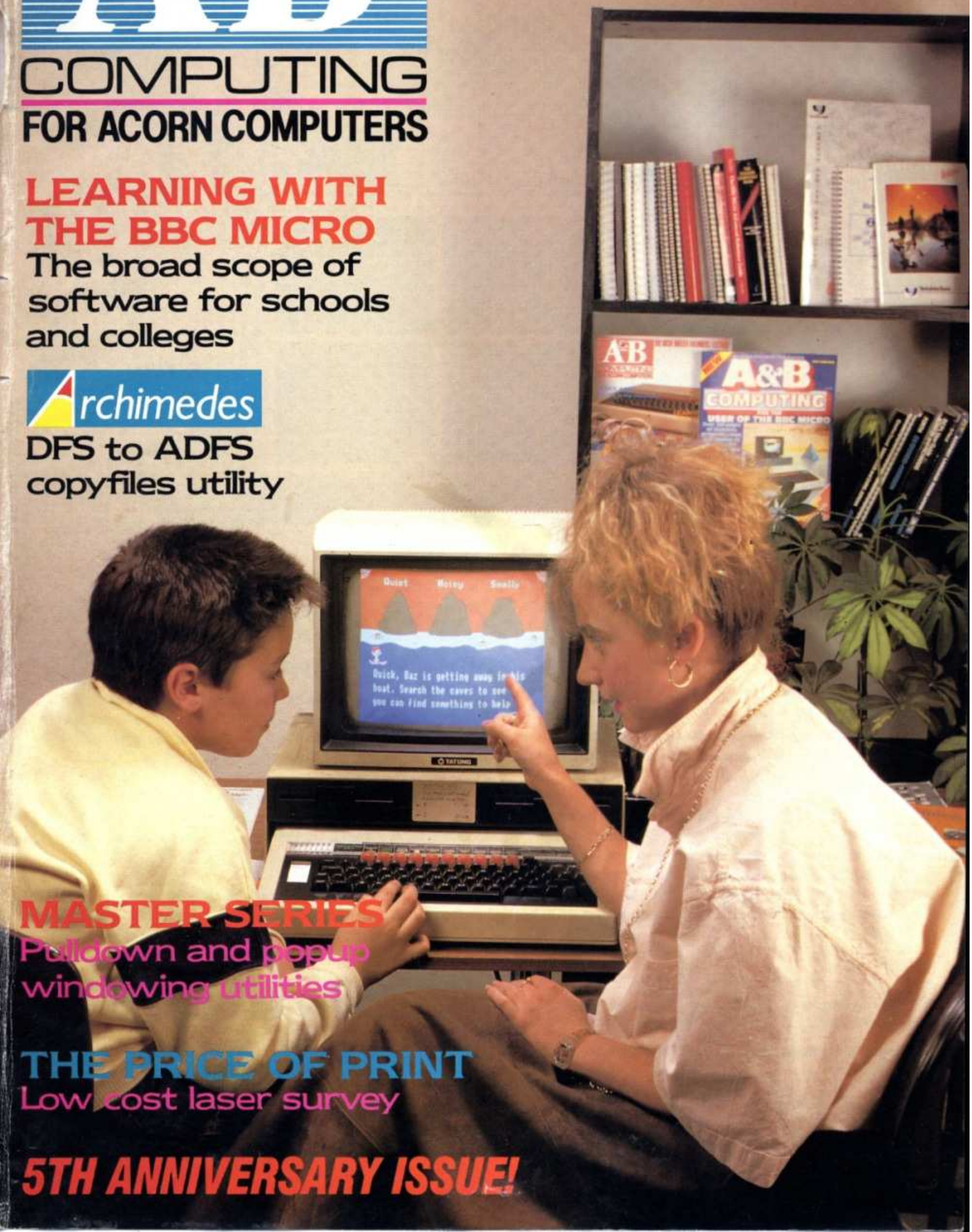
14 LAL

## LEARNING WITH THE BBC MICRO

The broad scope of software for schools and colleges

Archimedes

DFS to ADFS copyfiles utility




## MASTER SERIES

Pulldown and popup windowing utilities

## THE PRICE OF PRINT

Low cost laser survey

## 5TH ANNIVERSARY ISSUE!

aturing
hartbusters

# Play It Again Sam 2

## SUPERIOR'S BEST COMPILATION YET

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Crazee Rider, a fascinating motorcycle-racing game, features seven international racetracks. "It's fast, challenging and there's plenty to keep you entertained. Thoroughly recommended" remarked The Micro User.

Galaforce is the thinking-man's alien-zapping game; fast and furious, yet full of strategy. Oracle enthused: "You haven't lived until you've played this game. Buy it! — it's the ultimate in shoot-em-up. RATING: 20 (out of 20)."

Codename: Droid is a challenging arcade-adventure. The quality of the graphics and animation must be seen to be appreciated. Electron User summed the game up by saying "CODENAME: DROID is brilliant . . . it's worth every penny."

BBC Micro Dual Cassette.....**£9.95** Acorn Electron Dual Cassette.....**£9.95**
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**'ARTROOM...the best there is.'— Acorn User Feb '87**

**'ARTROOM is the software for you.' A & B Jan '87**

ACE consists of two programs. COLOURIZER enables you to produce MODE 1 colour versions of ARTROOM screens and to dump them to a printer using a shaded printer dump. The MODE CONVERTER program will convert any graphics screen into a Mode 4 ARTROOM screen ready for loading into ARTROOM. Conversions can be made from Modes 0,1,2,5 and 7, yes SEVEN!

**'...very pleased with the way Clares have introduced the colour facility.' A & B June '87.**

ARTROOM and ACE will work with any mouse but we recommend DIGIMOUSE because it is well engineered using a non-slip ball and optical encoders. DIGIMOUSE also includes the unique 'LINEAR LOCK' facility that enables you to draw straight lines freehand.

**'...impressed by Nidd Valley Digimouse' A & B June '87**

This complete package is marketed by Olivetti in Italy, the home of style and design.

**ACE** A STROKE OF GENIUS!

## BETA-BASE SAVE £7

**£30 5.25 inch Disc £34 3.5 inch Disc**

The Beta-Base pack consists of Beta-Base, the number one database for the BBC micro, and Beta-Base Utilities which extends the power of Beta-Base.

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**'We use Beta-Base ourselves' Mike Bibby, Editor of MICRO USER.**

**'Rated best value for money'—ACORN USER Dec '84**

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The UTILITIES PACK consists of RAMROD and MACROM. RAMROD is the ultimate toolkit ROM and it is compatible with the whole BBC range and includes a disassembler plus editors for DFS, ADFS, RFS, memory, Shadow memory, Sideways RAM, Tube plus lots more. RAMROD will take you to the furthest reaches of your machine and enable you to boldly go where no ROM has gone before!

**'an ingenious collection of utilities...' BEEBUG Oct '86**

**'worth its weight in gold.' A & B Jan '87**

MACROM is a fast full featured MACRO ASSEMBLER that allows the use of macros, which are loaded from disc. MACROM has its own easy to use editor which automatically formats your source code. A HI version of MACROM is supplied for use with the second processor. A macro library and demonstrations are also supplied.

**'Full marks for an excellent product.'—BEEBUG JUNE 1986**

We are also making BROM+ available under this offer. Its main feature is the full scrolling BASIC editor which allows the user to edit a program as if dealing with text in a wordprocessor. There are many other features dedicated to making life easier for BASIC programmers.

**'This is the best BASIC screen editor I have so far used.' —MICRO USER August 85**

For BROM+ add £25 on ROM, £20 for 5.25 inch disc or £22 for 3.5 inch disc.

When ordering please state the following:

Machine
Disc size (5.25, 3.5)
Disc format (40 or 80)
DFS version

N.B. If ordering for a Master or Compact please state DFS or ADFS. The ARTROOM pack is for the Master or Compact only but all other software is available for all machines.

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FONTWISE+ is compatible with WORDWISE, VIEW, INTERWORD, MINI OFFICE II and EDWORD II.

**'FONTWISE is better than many NLQ packages'—ACORN USER Sept '86**

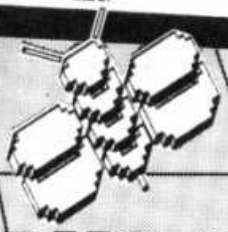
The FONT EDITOR is very easy to use and allows you to edit the current fonts or create new ones. Reviewers have praised the editor for its ease of use and faultless presentation.

**'editor is impressively quick, smooth and easy to use'—A & B**

**EDITOR '...puts all previous designers to shame.'—BEEBUG July '86**

Ask for a sample printout.

**Suppliers of top quality software for the range of Acorn Computers**



# Clares

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A&B COMPUTING

**Volume Five Number Five May 1988**

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# Archimedes
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The ARCHIMEDES TOOLKIT was the first toolkit for the Archimedes. It is still available for £39.95 but we have improved on the original with TOOLKIT PLUS. All of the previous favourites are there:

* 10 Fast memory and disc editors
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Plus

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Plus

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Plus

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You need TOOLKIT + so order today.

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ARTISAN is not just an art package it is THE art package for the Archimedes. We are not going to bore you with lists of features, just take a look at the picture to see how good it is. Just to prove that we aren' t the only ones who think its good take a look at what the magazines think:

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*ACORN USER February 1988*

**ARTISAN** is a highly superior product... very classy... the manual clearly explained all the many features... go on buy this package now.

*RISC USER November 1987*

**ARTISAN** makes the Archimedes superb... a truly professional product... The possibilities are endless. I can certainly recommend **ARTISAN**

*MICRO USER January 1988*

deserving of special mention is a facility called Magic Brush... a true cut and paste... **'ARTISAN'** wins hands down.

*ARCHIVE February 1988*

**ARTISAN** represents excellent value for money... superbly designed pop up menus... very friendly, foolproof and quick to use... incredibly easy to use... Instantly appealing... superb features...the Magic Pen is unique to **ARTISAN**... Quantel would have been justified in getting a little upset... well organised...

*A & B December 1987 & January 1988*

## ARTISAN SUPPORT DISC £19.95

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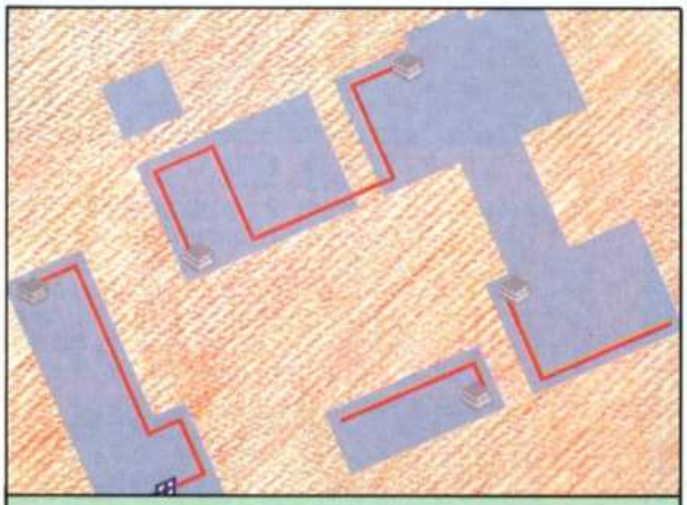
# NEWS

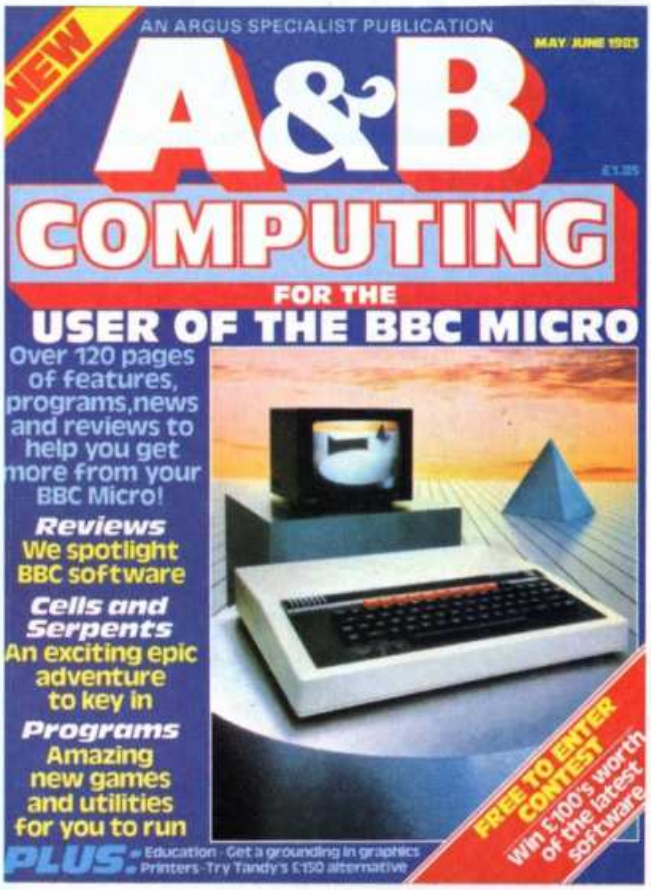


## Econet gets a boost

The latest addition to the Econet Local Area Network system is the Filestore E20. Consisting of a separate unit that slots into the E01, the basic stand-alone unit for the Econet system.

Anyway, the E20 consists of a 20 Megabyte winchester disc – a 3½ inch drive just to ram home the idea of compactness, a switched mode power supply and the Filestore expansion bus socket.

Prices were not given at the time of going to press, and Acorn weren't able to help me, so ring them on ☎ (0223) 214411 to find out more.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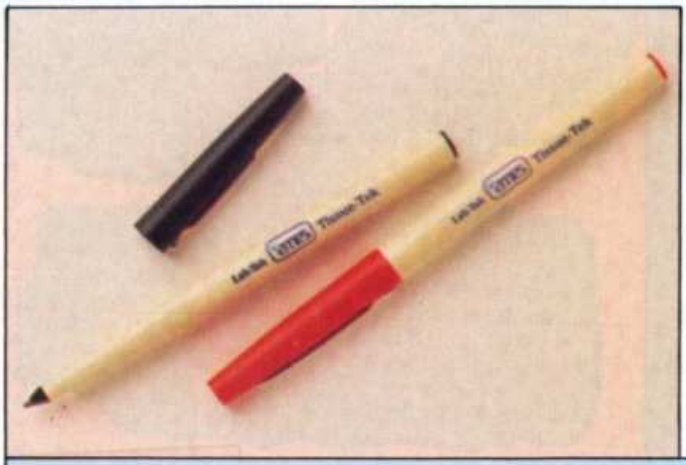
## Now we are Five!

This time five years ago, a magazine hit the news stands – called **A&B Computing**, it cost £1.85p.

Five years later we're still at it, and the BBC market still shows no signs of slowing down – indeed, with the advent of the Archimedes, it seems that even the humble 8 bit BBC Micro will carry on for a good many years.

By way of a quick impromptu competition, we are offering a mint first issue of A&B Computing to anybody who can tell me which contributor has written the most articles for the magazine – Hah, that'll teach you to throw away your back issues won't it!

Answers on the back of a postcard please to: **First Issue Competition, A&B Computing, 1 Golden Square, London W1R 3AB**.



## Stupid Pen Theory astounds Assistant Editor shock horror!

This isn't an April fool number, it seems that *Miles Laboratories Ltd.* have turned their expertise to manufacturing computer pens.

Their all-singing all-dancing marker pen is designed to withstand "placing in a mist" at 60 degrees centigrade, immersing in a cold tank of solvent and, wait for it, "other normal procedures in your industry" – good... good, is this the sort of thing you are likely to do to a pen?

No doubt it has been ergonomically designed to fit into the palm of the hand with the ease that only a very special computer pen can achieve – even if they are churned out by the million somewhere in the middle east!

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## For users of the BBC Micro, Master and Compact

# RISC USER

## For Archimedes users

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The magazine is now in its sixth year of publication with 20,000 subscribers throughout the world. Its proven format has been invaluable to serious BBC Micro and Master computer users in the home, education and business.

Each issue of BEEBUG provides 72 pages of articles, programs (utilities, applications etc), tutorials, workshops, reviews, hints & tips, news and information to beginners and experts alike. All our programs are tested on all versions of the BBC Micro, and are also available monthly on disc or tape.

## RISC USER

This is the magazine for anyone interested in Acorn's RISC computer, the Archimedes. Launched at the same time as Archimedes, RISC User provides lively and informed coverage of what's happening in the world of Archimedes.

Reviews, hints, programs and articles are all specifically written for Archimedes, showing how to exploit the many features of this sophisticated computer. RISC User is all about the Archimedes, it does not contain modified programs originally intended for the Model B or Master.

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AB 5

# Archimedes

## BEEBUG the recognised Archimedes specialists.

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Stock code **0796C** Members price **£17.25**

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| | | |
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| 1081B ISO Pascal | 113.85 | 108.16 |
| 1082B Fortran 77 | 113.85 | 108.16 |
| 1083B Twin | 33.35 | 31.68 |
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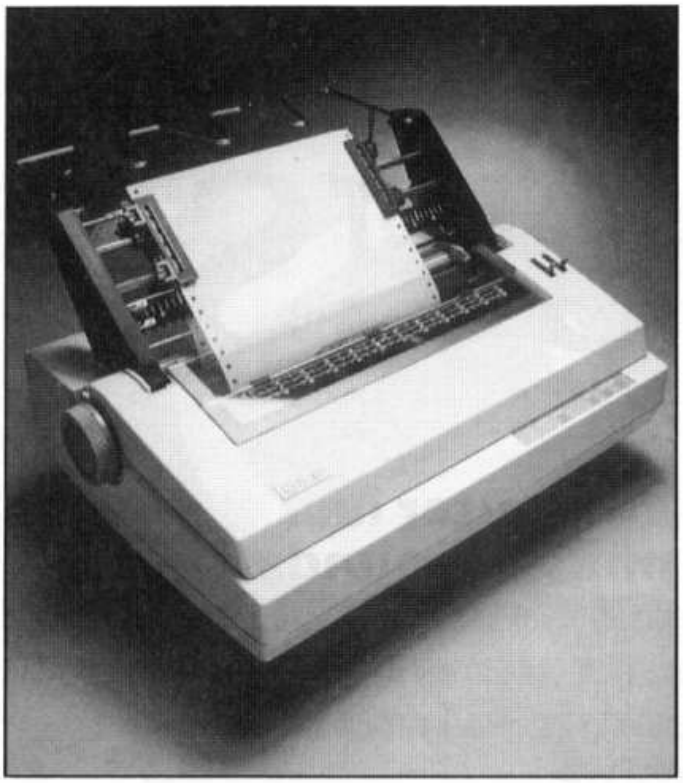


## Printer Pool

*Qume UK* have recently lowered the price of their *letterpro 20* printer from £450 to 375 inc VAT. This printer can accept a variety of input sources including RS232, Centronics and IBM Displaywrite II formats – there are well over 100 print wheels available for this printer – competing with text only laser printers but at a fraction of the cost.

Qume have also launched a competition to find the oldest Qume daisywheel printer at the Which Computer Show in January. The winner will probably be an owner of the **Sprint 3** printer which was introduced in 1975 – the prize? A brand spanking new *LaserTEN Plus* printer worth £2,683! The Sprint 3 was also badged as *IBM, AB, Dick, AES, Philips, CPT, NBI, Triumph Adler, Wordplex* and *Lexitron* – all of these badged models are eligible, just telephone ☎ (0635) 523200 to obtain your entry form.

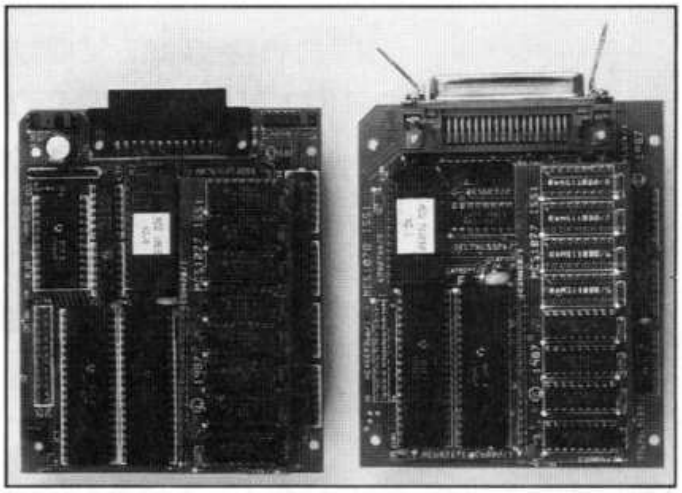
**Mannesman Tally** have been cutting the price of their MT dot matrix printer range quite considerably this month. The *MT 85* (80 column, 180 CPS printer with plug in font cartridges) costs £325 plus VAT, whereas the *MT-86* (same spec. but 136 column) costs £100 more.

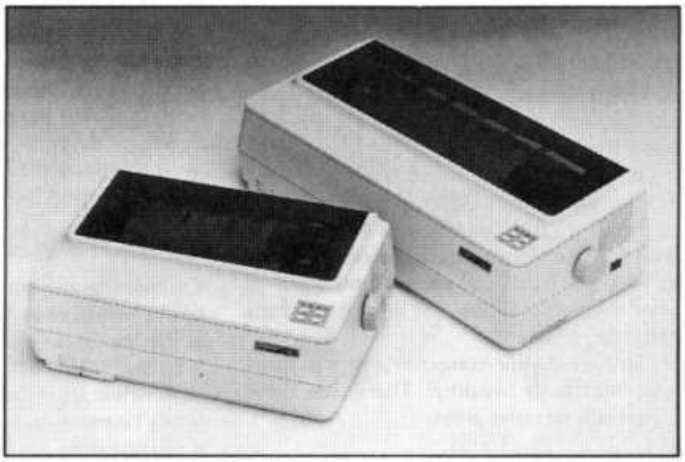
Pretty ugly looking creatures aren't they? but at prices like these, I don't think anyone will really mind!

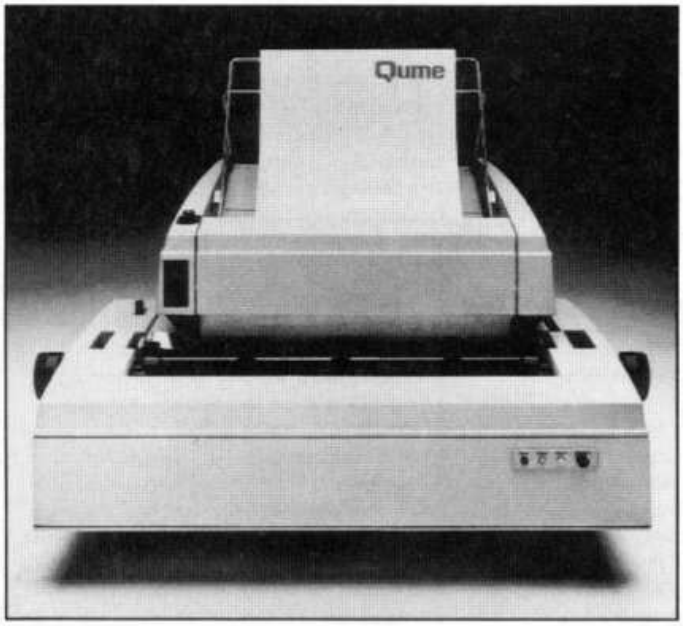
**Micro Control Systems** have extended their range of internal Epson printer buffers to acommodate even the largest of print jobs; the new units provide 512K and 1Mb expansions respectively.

Singularaly boring things you may say, but the interesting thing is the price – at £289 for the 512K model, and £399 for the 1Mb version, these boards will probably be a standard for Epson printers used in small businesses and probably a few in the home as well as they compete well agains smaller 128K printer buffers and external units.

**Contact Micro Control Systems at ☎ (0602) 391 204.**








## Acorn start Training Schemes

Acorn really seem to be getting their act together as far as supporting the Archimedes is concerned.

A series of seminar courses are being finalised to start on the 7th of March – these are for software developers and companies wanting to know the ins and outs of Acorn's Arm processor – the heart of the Archimedes computer system. The courses run from 9.30am to 5.00pm and include lunch, coffee and tea as well as supplying all of the relevant course material made available.

The first of the courses are on the 7th and 8th of March. In view of the lousy documentation concerning the ARM, I can imagine these courses will be in great demand.

**Contact Acorn's training Centre at: Cambridge Technopark, 645 Newmarket Road, Cambridge, CB5 8PB. ☎ (0223) 214411.**

Bryan Ralph



# ABACUS

## When did your computer last earn you a cool million pounds or even a tepid tenner? This month Abacus shows how to convert your micro into a goldmine

Is your computer a freeloader? You treat it impeccably; ply it with the best electricity that money can buy; pamper it with flashy add ons and interfaces and what does it do for you in return? Bleeps occasionally; prints the odd label and perhaps plays a game with you if the mood takes it.

Isn't it about time your computer started speculating on your behalf to pay back some of the hard earned cash you've lavished on it over the years? If you agree, you'll be pleased to discover that the earnings potential of your micro is limitless – as long as you have the right software.

So how is your computer going to make you effortlessly wealthy? There are three potentially lucrative areas.

### 1 The Stock Market

The world of stocks and shares has had the 'crash', the 'Big Bang' and soon – wallop – decision-making investment software. Millions of pounds can be lost in the time it takes the overstressed broker to take a slug of Perrier and several leading companies in the square mile are testing software that can analyse market trends and recommend what to buy and sell. It's only a matter of time before the public can trade in shares from any terminal.

Just think. In the time it took to read the previous paragraph your micro could invest your life savings on the stock market and make you a fortune. Alternatively it could bankrupt you in the time it takes to reach the next full stop.

### 2 The Football Pools

Football is universally recognised as being "a funny old game". Writing a program to predict score draws has proved unreliable compared with the tried and tested, 'I've put down the dates of all the families' birthdays on the coupon the last 35 years' technique adopted by most big winners.

### 3 Horse Racing

Computer punters using software form books have been as much the bookies friend as the 'stick a pin in the Sporting Life' brigade.

It would seem that the software simply doesn't exist to make your computer a moneyspinner – until now.

Abacus is proud to announce its exclusive Overnight Millionaire Software Suite containing not one, not two, but three programs designed to make the user unimaginably wealthy.

### 1 Laughing Stock

This package is guaranteed to be sensitive to the subtle changes in the emotions of the stock market. Just type in, "the market feels a bit edgy today" and the program automatically carries out profitable transactions on your behalf, just as it would if told the market is 'strong', 'depressed', 'ebullient', or 'delirious'. One stockbroker, when told about the program said, "This software sounds so good I need never throw myself off a window ledge again, except for fun."

### 2 Back of the Net Profit

Winning the pools has nothing to do with football. Other forces are at work. Abacus has created a unique algorithm using the birthdates of everyone in the United Kingdom combined with data on the star signs of all the players in the Football League and the biorhythms of the referees and linesmen.

### 3 Goodbye Betting Slips

This is a major breakthrough in prediction management. The very best software (including 'Irrational wild guess because you like the name' function) can be linked by modem to a network at the racecourse to glean vital last minute information so that, for instance, what the jockey had for breakfast or what the horse had in its nosebag can be fed into the computer.

By now you may be thinking, 'If this software is so good why hasn't Abacus retired to live in luxury?' A good question. Like all great steps forward the Abacus Overnight Millionaire Software Suite has not been without its teething troubles and Abacus would like to hear from any millionaires who have made their money from speculative software – just to compare notes. Please send examples of your software and examples of your money to Abacus c/o A&B Computing.

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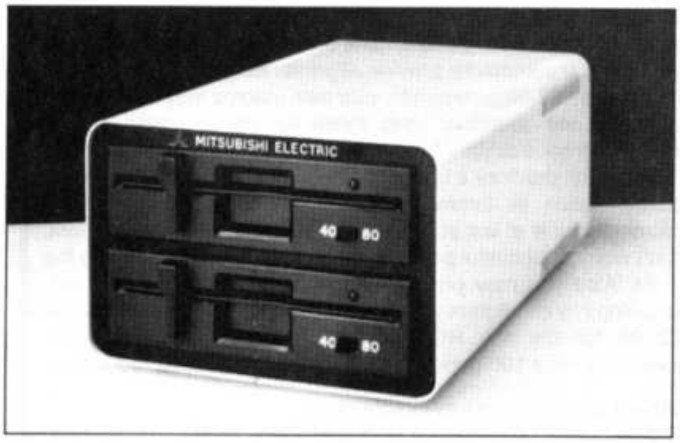


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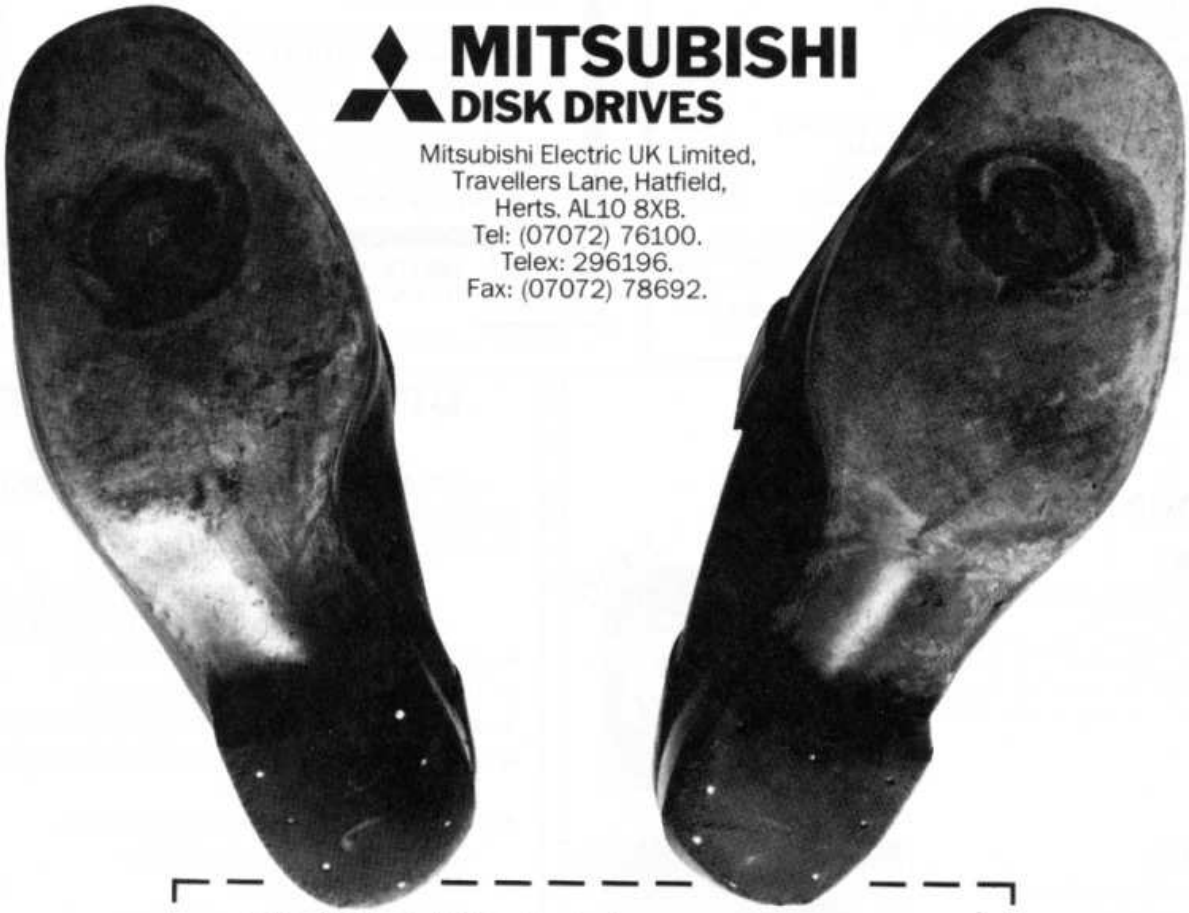

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Dave Reeder

# THE ARCADE

**A strange month indeed. Where are the games reviews? The exclusives? The wit, the charm?**

## Welcome!

This is a strange month, I'm afraid. Normally, as you know, I am beseiged by games from software companies eager for exposure to the eagle eye and steady hand of your columnist but not now.

Part of the problem I suppose is that this is a bad month anyway – all the real gems were released for the Christmas/New Year spending sprees, leaving February as the cruellest month.

Also a problem just now, I'm afraid, is my new fulltime job – what? you thought A&B paid such massive amounts that I could live in style on *this* - as a writer of promotional material for IBM software suppliers. Seems that my new bosses think (very unfairly) that I shouldn't spend large amounts of each day chatting to Beeb software houses about the forthcoming zappers. Hence a truncated *LOADing Soon this month.

Apologies. Normal service will be resumed as soon as I beat some sense into them!

## Game of the month

**Cyboto Go-dax Model B/Electron**
**Tape/disc £9.95/£11.95/£14.95**
**Graphics/sound 7 Playability 8 Originality 7 Options – Value for money 8 Lifespan 8 Overall 8**

Things are getting serious. We have a new software company Go-dax – masters of some fairly crucial software packaging, incidentally – who for two months running get a Game of the Month award.

Strange days, indeed. In fact, I do think that *Cyboto* is great fun but it is a little similar to other recent releases to be really astounding. Yet another overhead projection arcade adventure.

The game too is fairly standard: twenty levels, each of which have to be explored, cleared of treasures whilst baddies are either outwitted or destroyed with a body shield. Nothing in fact that should take you very long to accomplish but still I'm drawn to it.

However, let me first disabuse you of a rumour currently doing the rounds. The game is coded by Gary Pennington and despite the fact that he comes from the north-east and the fact that Go-dax is run by Darryl Still, ex-ASL software manager, this is not, repeat not a pseudonym of the much missed Gary Partis, who also lives in the north-east and used to work closely with Gary Partis. Take my word for it, and rejoice that we've got yet another strong Beeb games programmer on the scene.

Anyway, to return to the game. What really intrigues me in this is – well, I'm not really sure. The graphics aren't too detailed, the game play is a bit samey and not too much happens. But it does intrigue me and there are touches that delight – a pre-title wire frame rotating figure, for one. A system of passwords so obvious that a child of five with a classical education could break – don't knock it; John Stuart Mill was fluent in Greek at four (History made easy; lesson 1).

Now that may not add up to much for you but in the desert a man cluches at even the dream of water. This is a thin month; this is still a fun game; perhaps in other times there would be other decisions.

Who knows? I only play the games and write the words. You decide. But I think that this is going to win a good number of fans who can't get enough of the *Ravenskull* or *Kourtyard* type gameplay.

## Tutankamun's Revenge

**Bug-Byte Model B Disc £7.95**
**Graphics/sound 6 Playability 7 Originality 7 Options editor Value for money 7 Lifespan 6 Overall 7**

At times it seems that Bug-Byte has lost their way – one moment great instant classics like *Plan B*, the next sub-standard releases. No discernable, no market strategy.

Take this latest release – disc only. Who ever heard of such a thing? And, apparently, they were dithering right up to the last minute about whether to release it at all. Well, be pleased they did. Now this is nothing outstanding, you should understand, but it will idle away a few fleeting hours and may even win some rabid support.

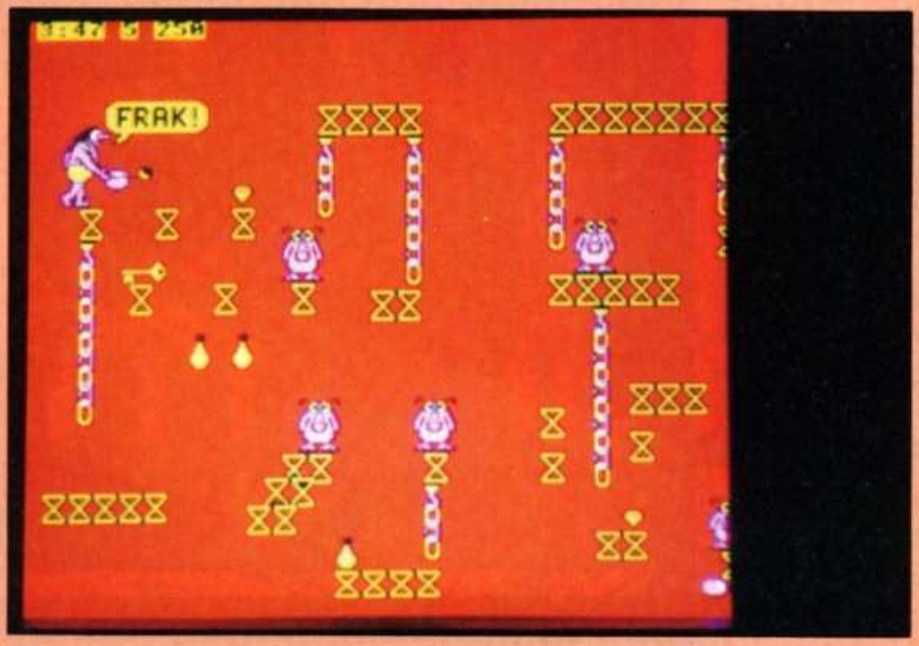
Imagine the scenario – the pyramids of the ancient Egyptians. Lots of treasure, lots of traps and curses and all sorts. Just right for an arcade adventure, wouldn't you say? Of course you would.

Not that the gameplay will necessarily enthrall you – platform games have been around for too long for that.

No, what is intriguing is the way that some rooms change with hidden doors opening when you collect treasure elsewhere. There's more than simple navigation and jumping involved here.

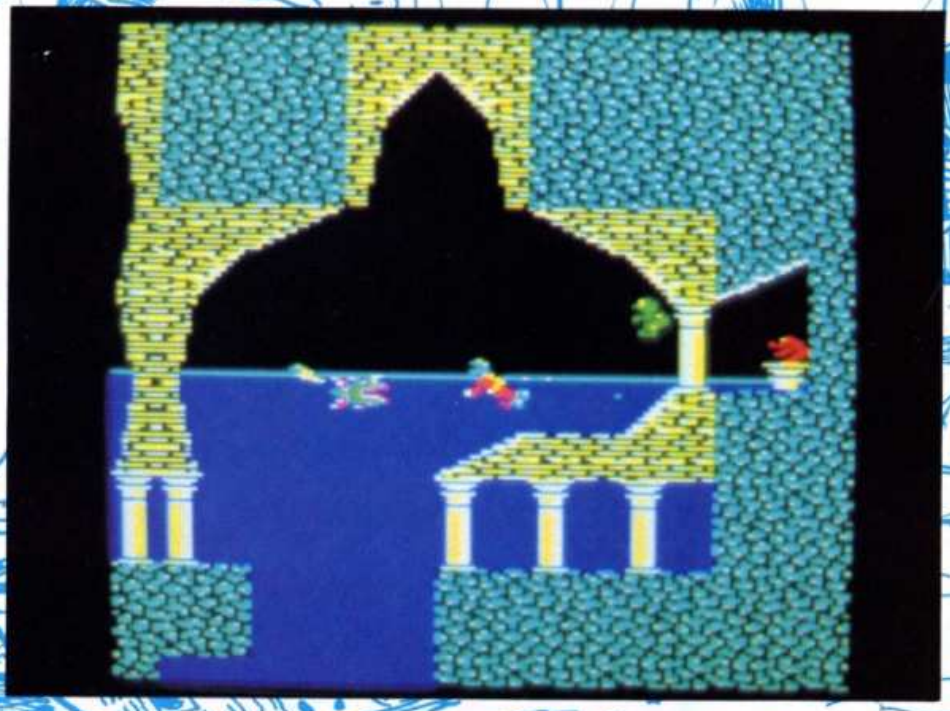
Couple that with a nifty little screen designer and you have a pretty good package for the money. Play the game but beware the curse of the Egyptian kings – even if it takes 80 years it will get you in the end!

**Frak! A blast from the past.**

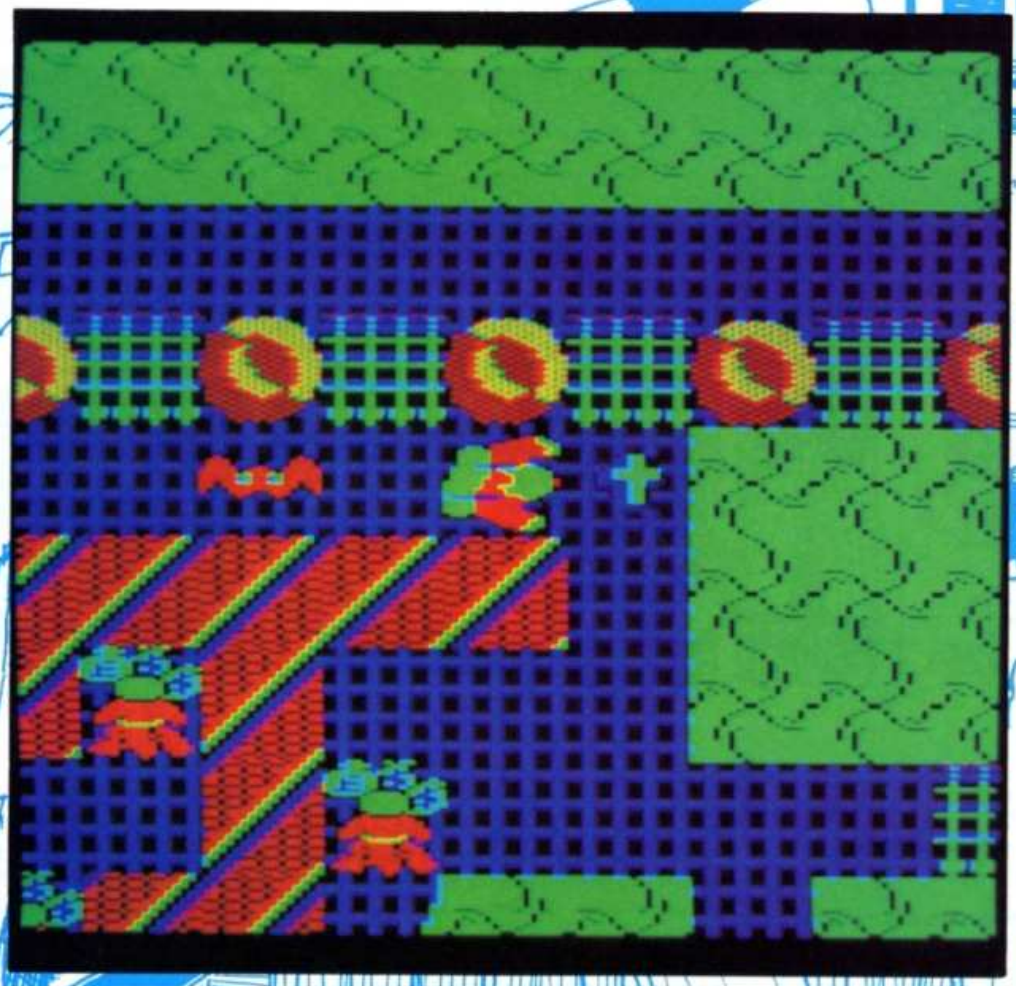


# ARCADE Alley

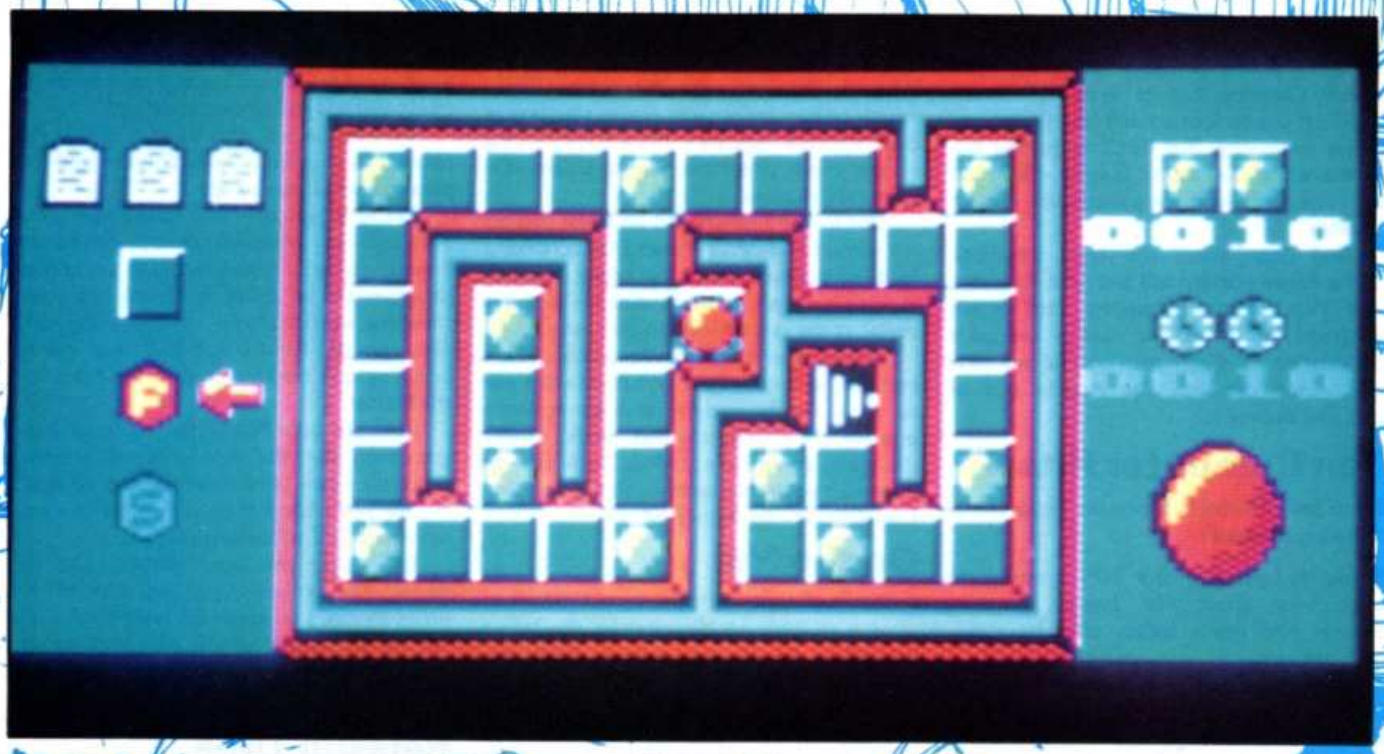
Exile. A new release from Superior?



And another shot from Exile.



King Tut's revenge. (yes we forgot how to spell it)



The BBC Micro's answer to Marble Madness.

## Five Star 3

**Beau Jolly Model B/Electron Tape**
**Compilation overall 7**

A couple more compilations this month from Beau Jolly who, sadly, don't reissue this stuff fast enough in my opinion.

Have you got a copy of *Frak!* by Orlando yet? If not, then rush out and buy this at once – the package is worth it for this superbly detailed and humourous platform game starring everyone's favourite Neanderthal. It's quite simple – this is one of most people's top ten games of all time.

Couple that with Peter Scott's wild and detailed arcade adventure *ThunderStruck* and you'll already got good value; add in the lunatic *Caveman Capers* with high speed travel on the back of a turtle and you've got insane marketing. But that's forgetting the excellent train simulation *Southern Belle* and the respected words only adventure *Project Theseus.*

And what about the flight simulator *Strike Force Harrier* and the fight simulator *The Way of the Exploding Fist?* Seven programs for the normal cost of five on a compilation for the normal cost of one new one – this one has The Arcade seal of approval all over it.

## Ten Computer Hits 4

**Beau Jolly Model B/Electron Tape**
**Compilation overall 8**

If you thought *Five Star Hits 3* was good value, what about this? Twelve games – twelve! And not a turkey amongst them; well, not quite.

Let's start with the obvious winners – Superior's *Repton* and Aardvark's *Zalaga* – the first in a seemingly endless classic series and Orlando's mega-classic zapper. If these are not in your collection, then shame on you.

Couple those with some more Superior gems from the last couple of years – *Thrust, DeathStar, Galaforce* and *Karate Combat* and you start to get the feel for what great value this compilation is. Throw in Gary Partis' *Uridium* clone *Psycastria* and a couple of rather dated Micro Power releases *The Mine* and *Killer Gorilla* and that still leaves room for *Blagger* and *Bug Eyes 2!*

I can't believe this compilation. At least six all-time classic games plus some great support and all for the price of one new one. If you haven't got all of these already, then you'd be absolutely crazy not to run out and hand over the cash. Now.

## Competition Time

You only have to read this column for a month or two before you realise that one of the respected regulars is Mark Gidley – king of the cheat programs almost before the games are released.

Last month I mentioned his latest project – a second mail order *Pokes Disc* containing loads of goodies. We'll be taking a closer look next month but meanwhile we have five copies of the second issue to give away.

All you have to do is invent a poke. Not a real one, so breath again. What we want you to do is simple – think of a game and a possible cheat program that would render the game completely useless. Such as – an *Asteroids* poke that removes all the asteroids. Clear? Good – write in now!

## On the Net

A couple of issues back we started to look at what is available on Micronet for the games enthusiast. So far we haven't been too successful at providing a regular update on what's actually available at present – mainly because of the time lag between stuff appearing on the Net and A&B appearing.

Never fear! We'll take a slightly different approach from now on.

Okay. Firstly, Micronet is a cheap online system allowing you access to a whole host of databases, either specific computer areas or else, through Prestel, to the world at large. I'll leave it to the Comms section of A&B to get technical but all you really need to access it is a simple modem and a quarterly subscription.

Enough free advertising! What are you going to get? Well, apart from useful news and so, Beeb owners have several specialised areas of interest: a technical help area, lots of hardware hints, tips and reviews, software reviews and teleshopping (ordering via computer at a slight discount), contact areas where you can find friends, ask for help about games or buy/sell equipment, several independent areas for contacts, whole hosts of Music 500 tips and software, etc etc.

So much, in fact, that I find it is only the phone bills that limit my exploration and the picture changes day by day.

Taking a typical month (December), the new software available included utilities like a menu maker, a typing tutor, an astronomy program and an index for home brew enthusiasts, special *Shades* utilities, Music 500 files, the AU listings and four new games including one two-player game and one for the Master.

Software boss Phil Godsell is to be congratulated for the nice mix he creates, especially when old favourites crop up again in case you missed them. Elk users too can run about 25% of the Beeb software.

So, should you join Micronet just for games? No, probably not. But, with all the other extras, I do think it's worthwhile. It's not perfect but it's fun and, most importantly, it opens up use of your micro to the real world.

## Reissue Time

**Bullseye 7 Treasure Hunt 6 Roundheads and Cavaliers 6 World War I 6**

A slightly new approach here to the sudden influx of reissued games, all four incidentally rereleased by companies other than the originators.

Firstly, we have Domark with their nifty new TV Games label slipping out Macsen's 1984 *Bullseye* and 1986 *Treasure Hunt*. The first is horrendous – your TV set invaded by an very overweight bull in tasteless shirt inviting you to step up to the ockey – incidentally the mark used by medieval archers (History made easy; lesson 2).

I've no patience with this game on TV – I abominate the gross specimens who become media heroes by drinking too much lager and throwing darts, let alone the execrable Jim Bowen. So I might be a bit biased here. The game is pretty good if you can forget the setting – the darts simulation is reasonable although the general knowledge questions are very unforgiving. For example, it will only accept 'Rocket' as Stephenson's first train, not 'The Rocket'. I know there are better quiz games around and this will really only appeal to lovers of the bizarre and tasteless.

Thankfully *Treasure Hunt* does not contain the ubiquitously unpleasant Anneka Rice – we must be thankful for small mercies. In fact, this is a good package – you get a cut-down guide book to the UK and there is some real mental work involved in sorting out the clues. Graphically uninteresting (apart from a map showing the position of the helicopter, it's all text), it is still very playable. But I do wonder if you'll want to return to it often as you're bound to recall the solution to the clues. However, a good adaptation of a TV game.

## Repoball Diary

Time moves on inexorably and John Mackay's *Repoball* grows and grows. Is it finished yet? Read on and discover...

*Sunday, 17th January.* Spent some time copying a few of the guardians from drawing paper to the screen. To draw the eyeball and the sphere I used an elipse routine ('cause Mode 2's pixels are wider than they are deep) to draw a circular looking shape on a blank screen. I then saved the screen and used a small program to convert the appropriate piece of screen into vertical sprite format, which I'm currently using. Following that, I bunged the data into the sprite editor, tidied up the rough edges, drew in the graphics and voila....one grotesque eyball.

Why eyeballs almost always travel alone in computer games is a strange phenonema indeed. Probably fed up staying so close to each other for so long that when their chance for an appearance on the big screen comes along...they go it solo! In this particular case the problem lies with the good ole raster. Some fool gave him too much Ready Break for breakfast and the little bugger always just seems to beat my routine to the screen. I'll give him glow in the dark if I ever catch the swine outside the tube!

*Monday, 18th January.* Due to a bad sleeping cycle I got myself into at the New Year, I didn't wake till 5pm and didn't do any work after it.

*Tuesday, 19th January.* Woke up same time as yesterday and once again no work!

*Wednesday, 20th January.* Got to sleep at 8am and was up at 12am. Rushed into town to catch the Chinese shopper's lunch and collected some film for taking the screen-shots. Just happened to be passing the arcade and I thought: "Gosh, What a coincidence!". I entered and played a few games of *Salamander, R-Type, Wec Le Mans* and, yes, *Street Fighter*. I thought I might have better luck this time and noticed that the price had dropped from 30 to 20p. Now I'll be able to conclude my long running fightmare with this bald, elderly citizen (closest printable translation). "China!" the machine yells. Up comes the great wall and the first mug.

The action starts and at this point I realise that the difficulty switches in the machine are all well and truly flipped. I jump into the air and about to do the spectacular flying side kick to his nut when he responds with one of his own. Wham! And the bold John lies in the corner in a heap with almost half the energy gone. Oh aye. This guy's dead meat! I jumped up and tried to sweep him while thumping-like mad on the pad and once again our oriental friend moves with money-taking speed and precision. A double palm strike to the chest retires me from round one.

I was still staring, motionless at the screen when the Great Wall and its now hated inhabitant appeared once more. I doubled my efforts. Three hits and it was over. No way!. This is robbery!. I walked away from the huge machine in a mixture of disgust and mortal embarrassment! I didn't get one hit in during the whole half minute I was playing, never mind wasting the Grandmaster on screen 2. Stupid game anyway. Never wanted to play it in the first place.

*Thursday, 21st January.* Five o'clock again, I'm afraid. This is proving detrimental to the coding side of the game so I'm not going to bed tonight at all, in an attempt to break this sleeping pattern. In fact it's now 7.02 on Friday morning and I'm taking the screen-shots. The ones I took show a couple of the baddies which are still upside down. Repo is now orientated properly though! The screen-shots basically show the game with a small portion of the landscape graphics and a few bullets sprayed around. Don't expect anything much till next month though. What I've basically got left to do is finalise some of the rough moon structures that I've drawn, sling them in with the rest of the graphics, finalise the moon data and enter it – about three days work!. I've also to drop in the rest of the sprites.

I've got most of the routines done now that serve the game core – score, sound, animation, movement routines etc... and it's now basically a case of writing the core and creating the data that the routines need to do their work. In other words the different alien attack paramaters, sound effects data, velocities for the Ball, bullets etc. The remaining routines to be written are the surface explosion, Repo park in the sky, where you can change the Ball model! – a bit like choosing between a Trans Am or a Pontiac Firebird in the car world and as with the motors, different models have different specs. No, and I don't mean the shades if there are any comedians in the audience. The trailing routines are high score and the like.

Thanks, John. The big question is – is the game finished? That will have to wait for another month – that dreaded deadline doom I mentioned earlier has also hit John's latest instalment. Doom, doom!

## Hints'n'tips
## Omega Orb

From Bogart comes a useful round-up of the places you must use the objects collected in *Omega Orb*. Remember that you should still use the core pieces as you go along.

Teleporter: any terminal. INPUT 4071: terminal 16 (far down and left as you can go). Passprog: terminal 0 (surface, right of start). Coke can: terminal 12 next to rubbish bins). Power cube: terminal 14 (left of descent from terminal 0). Board pass: terminal 4 (half terminal, right blocked by wall). Lever: terminal 1 (next to box with left pointing arrow). INPUT 29105: terminal 17 (left of terminal 1). Liftpass 1: any terminal. INPUT 17877: terminal 18 (right of duty free). Duty free: terminal 10 (down next to red/yellow wall). Laser card: terminal 5 (small triangle next to big laser). Info holder: terminal 9 (half terminal, next to library). Ticket: terminal 7 (below PICS sign). Five drachmas: terminal 2 (next to Toll 5 sign). Whistle: terminal 3 (next to big black wall). Quadlink: terminal 13 (after terminal 3 – four linked barriers). Laser gun: terminal 6 (next to big target). Protector: terminal 15 (next to core trapped in walls). INPUT 44073: terminal 19 (two screens right of terminal 15). Chocosnack: terminal 8 (above terminal 6). Relay: terminal 7 (below PICS sign). Flag: terminal 10 (right of airship).

And a quick cheat for tape versions of this game by Mark Gidley. This will give you infinite lives and make you immortal – it replaces the current file ORB6 so save it to a new tape and replace tapes when loading game at the relevant point.

```
10 *LOAD ORB6 2100
20 VDU7
30 ?&2218=&39
40 ?&2138=&2B
50 PRINT "Insert new tape and press key to save new version of ORD6"
60 A=GET: *SAVE ORB6 2100+AFF
```

## Fortress

From ADM comes a handy cheat routine for the classic *Fortress*. First type in the following short listing and run it:

```
10 !&380=&588D00A9:
!&384=&00006002
20 ?&220=&80: ?&221=&3
30 *FX14,4
```

Then set Page to &6800 and Chain "FORT1". Define the keys normally, press ▶▶

Break and *LOAD"FORT2". Then type in the following pokes, as appropriate:
For infinite lives: !&2C55=&EAEAEAEA.
For infinite fuel: !&29A3=&4C:
?&29A4=&C2: ?&29A5=&29.
For immortality: ?&2006=&EA:
?&2007=&EA: ?&2008=&EA:
?&200E=&EAEAEAEA: ?&2012=&EA:
?&2013=&EA: ?&2014=&EA.
Then CALL &3DE8. If you downloaded the game from Micronet, CALL &3DF9 instead.

## Green Beret

To encourage you to return to this game, here's a quickie from Shaun Howitt. Tape only, I'm afraid.

First *LOAD"BERET"1100 and then type in: ?&1FBE=&EA:?&1FBF=&EA for unlimited lives; ?&1FBC=&D0 to advance a screen when you die. Then on a new tape *SAVE-"BERET"1100+3B35 1100. Swop tapes when loading game.

Use the same process on *Paperboy*. *LOAD"PROG"2000, ?&2D92=&F0 for unlimited lives and invulnerability, then *SAVE-"PROG"2000+2C00 2000. However, be warned that the game may crash if you complete a full Monday to Sunday week.

## Plan B Revealed

From regular tipster Optimus comes some hints for the great *Plan B*, quite timely as we looked at the sequel last month.

Some general advice first: don't get spanners, oil cans, ammo etc if your energy or ammo are already high – leave them and come back later. But do try and keep your ammo level high, else you'll have to restart often. If a screen becomes too hectic, then just leave and return at once – note it takes some time to liven up from scratch.

Near the start there's a room, south of The Crossroads, which has its entrance blocked by computer parts. To get in, approach it first from the west side and destroy the computers through gaps which appear if you shoot the walls. This is a technique useful throughout the game.

Shoot through a gap to destroy the bars blocking your way in The Tower – this gives a shortcut to the roof, instead of having to go via The Helicopter Pad. To get the key in The Dark Room, fall to the base of the screen and then work your way left. To get to Up In The Roof, aim for the to left corner, starting at the opening just above the entrance.

To reach The Cellar, shoot a hole in the left wall just past the ammo in The Basement. When you come to Not The End, again shoot a hole in the left wall to continue. Don't go west or east from Strange Things, Part 1 – if you do you'll remain on the same screen but be unable to get back up. A similar trick is used in Strange Things, Part 2 so don't use any keys here.

The computers in The Processing Plant are impossible to reach; instead, shoot through gaps in the walls from the right hand side to destroy them. To escape from The Mines shoot through a gap in Computers In The Basement.

A final word of warning – don't go down the tunnel next to The Cess Pit. It's a trap!

## Droid Time

A neat little listing from Richard Koten for disc based *Codename: Droid* fans. First set page to &900 and then run this program.

```
10 *INIT
20 MODE5
30 *LOAD STRYKER
40 ?&A99=&60: CALL&A00
50 ?&437E=L%
60 ?&2D0E=P%
70 ?&1EE4=&EA: ?&1EE5=&EA
80 ?&3273=&A9
90 ?&1EDB=&A9: ?&1EDC=1
100 CALL&7700
```

Note that L% and P% should be set for the number of lives and passes you require, in the range 0-255. Line 70 gives unlimited passes, line 80 infinite lives and line 90 enables you to use lifts without passes.

## Star Cracked

If you were quick enough to pick up a copy of the *Elite* type game *Star Clash* before it disappeared into a legal morass, then Mark Gidley's quick disc based cheat should be of use. It gives infinite energy and infinite shields.

```
10 C%=0:FOR I%=&380 TO &39C STEP4
20 READA%:!I%=A%:C%=C%+A%: NEXT
30 IF C%<>&2D7D51A THEN PRINT; "Error":END
40 ?&393=&60
50 ?&399=&60
60 PRINT"Now load in Star Clash"
70 DATA &98488A48,&03932048
80 DATA &68039920,&68AA68A8
90 DATA &A9DC934C,&5F0F8D01
100 DATA &8D01A960,&00605F15
```

## Quickies

We've run similar stuff before, but new readers are always joining us. So thanks to Glenn de Smidt for three quick pokes.

First, disc based *WAR* - *LOAD GAME2, type in ?&529A=no.of lives, *SAVE GAME2 1100+5600 6600, then RUN.

Next, an old classic – Ultimate's *Jet Pac*. *LOAD (main file), ?&307C=lives then CALL &5900.

Lastly, *Commando*. *LOAD (main file), ?&2C4D=lives, ?&2C53=grenades, CALL &5F00.

## Impact

A labour of love here by 'Runaway Mouse' – doesn't any reader of this column have a normal name like John Smith? Nothing more or less than the complete set of passwords for Gary Partis' last game before departing the games world – *Impact*. I can't be bothered to type in the levels as well – just count 'em yourself! **AEMYP: GWIYP: ICEYP: LMAYA: HCNYI: HOJYA: COFYP: CYBYA: FYOYI: IGKYA: MECYP: BAPYA: JELYA: KCHYA: JYDYA: OEMQP: BMIQP: HUEQA: LMAQM: KWNQI: GKJQA: JEFQA: FGBQA: HSOQO: DOKQE: MOGQP: LKCQH: BEPQA: AKLQM: HCHQG: PCDQH: BKMIP: AEIIA: MIEIK: GAAIA: GANIA: MSJIA: IEFIL: DEBIA: AKOIE: LAKIA: KCGIA: BACIA: HAPIA: BGLIA: BUHIJ: EADIP: EOMAK: LAIAD: JGEAM: FWAAF: PCNAP: GUJIA: NCFAA: MSBAA: KAOAA: GIKAI: OWGAN: IACAE: LSPAI: AELAA: PWHAI: OMDAM: IQMAI: PEIAP: JUEAM: BUAAK: BSNAH: PCJAI: CCFAI: CABAI: LEOAE: HCKAH: FCGAH: LYCAH: EIPAD: JSLAB: JIHAP: FADAK.**

## Map Time

It has been quite some time, I'm afraid, since we gave you excellent value for money maps. That changes now!

From the very industrious Richard Koten come some great maps for Superior's *Bonecruncher*. He's supplied me with some dumps for all 24 screens, but we'll start at the beginning with screensone and two.

He's also offered me a similar service for *Plan B*. I think you'd like to see that too – am I right?

## Archie Zarchie

You'll normally find all the Archimedes goodies on the *Red Keys* pages in this magazine, but I guess that Archie games freaks will probably read these pages. So, from Ian McAlpine, here are some general tips and thoughts about *Zarch*.

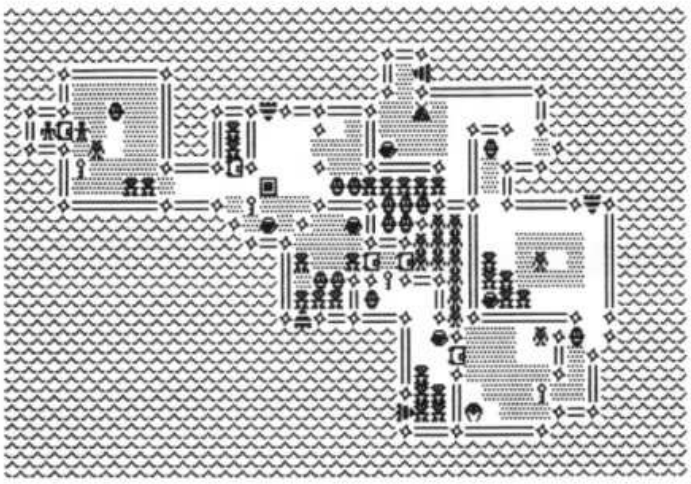
If there are a number of pests, mutants, drones and fighters after you, it may be advantageous to land on the launch pad and wait for them to swarm around you. Then use a smart bomb. Remember – on the launch pad you are generally immune but do watch your fuel level as the aliens can deplete your energy faster than you can refuel.

On each screen the seeders always start in the same place. For example, on the first screen you can immediately thrust to the top right of your radar screen to intercept the first seeder.

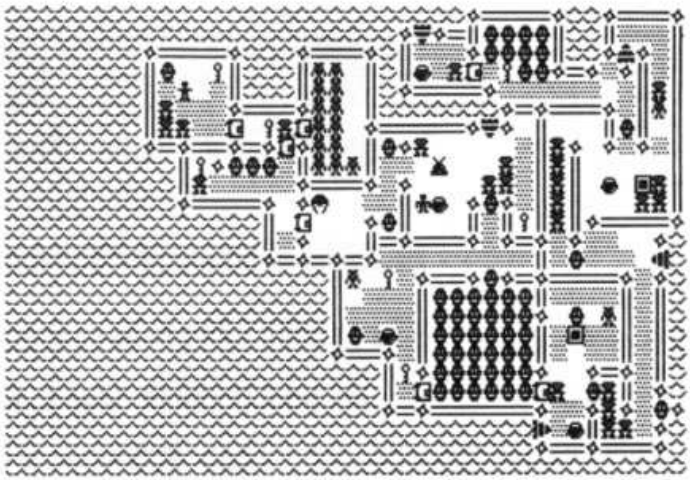
Try and destroy seeders while they are moving. Not only do you get more points but they do have a nasty habit of landing close to your radar installations – watch you don't destroy your own radar trying to hit them!

The Bomber is the hardest craft to destroy – leave it till last. If your fuel level is low, replenish it on the launch pad before continuing your pursuit. The Bomber always flies below the 'star line' within sight of the ground – use the zoom facility on the radar while in pursuit and align yourself just behind and above him. Then fire! Don't get too close else the proximity bombs will detect your presence.

As mutants, drones, fighters and pests dive down on you, thrust upwards and spiral



Screen: 1 Password:



Screen: 2 Password: Beginner

BONE CRUNCHER MAPS
BY RICHARD KOTEN

KEY

| | |
|---|---|
| BONO | TRAPDOOR |
| FOZZY | MONSTER |
| SKELETON | GLOOK |
| KEY | SPIDER |
| DOOR | VOLCANO |
| CAULDRON | EARTH |
| STAIRS | |

whilst firing. They explode as they pass through your hail of bullets. This process may need to be repeated several times, especially as the fighter must be hit twice before it is destroyed. In panic situations – don't forget the smart bomb.

Be careful when using your homing missiles while in close combat – they can home in on you!

I'm convinced the scenario is set in Scotland. The spiked-baked monster in one of the lakes is Nessie. Isn't it?

## Banjax

A game I enjoy returning to is *Banjax* - an oldish arcade adventure now, but still lots of fun. Simon Rollins thinks so too – he sent me a complete map some time back but it's too big to use here.

So, as a compromise, here's solution that should make sense if you play the game with this issue alongside the keyboard.

From the start you need to find the bag in which to store the treasure. Go right three screens, up two, left seven, up and right seven. Then up one, right one and up one to get the sack – now you can start collecting. Go down, left and down and all the way to the right for a ring, a crown and a coin. Return all the way left (collect penny), down, left and up, return and go all the way right. Back one screen, down one and left for three screens. Then down, left for eight screens and up, left and right and return to start.

So far so good – don't forget that if a screen looks hairy, just slip out for a second and return. Often it's then clear.

From the start go right two, up two, left two, down one and right, then retrace left and up. Go left five and up, right six and up two (right hand fork), down one, right and up. Then down one, left, down and up left hand fork two and up again for treasure chest. Down four, right one and up again. Right on top level one screen, up second path two screens, right, down one, right and then go up and down to clear another whole section.

Go left one screen, up two (left hand fork), left and up to top level. Go all the way left, then retrace three screens and go down two, right one and step up into the house. Go two right and up one, then back to entrance. Go left one, up one, down again, left another one and up three. Go four right, back three and down one. Retrace your path to the entrance and go back to top level.

Go all the way to the right – but drop down and left on the eighteenth screen for the ring. Back up and right again – the Guardian to the Golden Temple will only let you past if you have 61,000 points. Inside the Temple go right two, down five, right three and down three for the key. Retrace your steps to the start and go up into the Castle.

Up two, left one, up one, left two, up two, down and right five, up two, left one, up one, left one, up one, left one and down three. Right one and up, then retrace your steps all the way back to the Golden Temple.

From the entrance go right two, down two, right three, down two, left two and up the second Guardian. This time you must have 85,000 points. Finally, go one more screen to the right to complete the adventure.

I hope that's clear. If you haven't looked at the game for some time, may I recommend you dig it out. This solution might just inspire you again!

## *LOADing soon

**By Darrin Williamson**

● Who should turn up at A&B HQ but what seemed like the entire programming team of Superior Software all clutching prototype versions of their latest wares, and it has to be said, they really do look jolly good.

● For the BBC B comes *Pipeline*, another overhead projector graphic adventure who scrambles around the terrain and a complicated pipe network which is really the games main twist.

● Mainly for the BBC Master but also for the model B was *Exile* (provisional name only), a kind of Jet-Pac meets Castle Quest meets Codename Droid, very nice indeed!

● And for the Arc comes *Conqueror* a tank battle game subtlely blending the graphic quality of Zarch with the gameplay of Battlezone. Arcade and strategy versions of the game are included. A worthy follow up to Zarch if ever I saw one.

## And Finally...

And finally, we end a rather strange Arcade. A few months ago, who could have believed several pages of games material in a Beeb mag without any major releases. Just lots of background detail and contributions by the readers.

Still, don't worry. We'll probably still review this month's games before the opposition – after all, we do normally!

Meanwhile don't forget you can write amusing letters, deliver devilish pokes or hints and even tell me what you'd like to see in The Arcade via **Micronet mbx 919999020** or by post to: **Dave Reeder, The Arcade, A&B Computing, ASP Ltd, 1 Golden Square, London W1R 3AB.**

Frank Jukes



# SAFE SECTOR

**Frank Jukes takes us through a simple yet effective way to save your discs meeting an infuriating end . . .**

If you have used a disc drive for any length of time, especially in a school, you must have experienced that sinking feeling on the realisation that the drive has just been turned on or off with a disc inserted and the drive head in contact. The worry is of course that the disc has been 'spiked', with the result that one or two bytes of data have been altered somewhere.

This can be bad enough if it means that a program has been corrupted but programs can usually be loaded into memory and repaired fairly easily. The real headache occurs when the disc catalogue on track 0 is affected. The catalogue is written in the first two sectors of the disc with basically file names in sector 0 and addresses and file lengths in sector 1. If either of these two sectors, particularly sector 1, is damaged then it can be very difficult to retrieve data from the disc.

## Park That Head

One solution to this problem is to ensure that the disc drive head is not left over track 0 unless it is actually reading or writing to it.

Using two OSWORD commands we can arrange for exactly this to happen and for the drive head to be 'parked' away from the precious catalogue and, quite often, any files.

The first of the two commands is OSWORD &7E. This reads the catalogue for the current drive and determines the number of sectors on the disc. Knowing the number of sectors on the disc we can use OSWORD &7F with a command code &69 to 'seek' the last track on the disc and leave the head parked there, safe in the knowledge that any transient voltages will be quite unable to corrupt the catalogue information.

The listing assembles a machine code routine at &900 which incorporates the two OSWORD calls. OSWORD &7E reads the number of sectors on the disc. This is &320 (800) on an 80 track disc and &190 (400) on a 40 track disc. The value for any particular disc is placed in &71 (LSB) and &72 (MSB). If &72 contains a 3 we can deduce that the disc is formatted 80 tracks – & 3 20 sectors – rather than 40. OSWORD &7F is then used to step the drive head to track 79 or 39 as required.

## Program Uses

The routine can be saved with *SAVE SAFESEC 900 948 and then used in two ways. The first is the simplest and useful when programming. Enter *LOAD SAFESEC 900 from the keyboard and then set up a function key with CALL &900 M. From now on pressing the funtion key will park the drive head safely over the last track.

The second way to use the routine is from within a program. The code is loaded from disc with *LOAD SAFESEC 900 and thereafter can be used with <line number> CALL &900. By doing this immediately a program is loaded the head can be kept away from those valuable catalogue bytes.

Don't forget, once bytten . . .

**These listings have been checked using the *A&B Computing* Checker program. The four digit hexadecimal number in brackets at the end of each line is the "checksum" for that line and should *not* be typed in.**

```
>
>L.L. (A77E)
   10REMSAFESECTOR SOURCE CODE
 (882E)
   20REM(C) ASP 1988 (D383)
   30*K.0 CALL&900¦M (4E45)
   40osword=&FFF1 (8486)
   50code%=&900 (9515)
   60FOR pass%=0TO2 STEP2 (396
5)
   70P%=code% (2609)
   80[ (EBDD)
   90OPT pass% (7A6A)
  100.start LDA #&7E (AF8C)
  110LDX #&70 (D832)
  120LDY #&00 (347B)
  130JSR osword (6514)
  140LDA &72 (F141)
  150CMP #&03 (28D6)
  160BNE forty (AE26)
  170.eighty (D5FF)
  180EQUW parameighty (F865)
  190LDA #&7F (DD53)
  200LDX eighty (5E1C)
  210LDY eighty+1 (5905)
  220JSR osword (7FCC)
  230RTS (46CA)
  240.forty (54EB)
  250EQUW paramforty (3C27)
  260LDA #&7F (E9B7)
  270LDX forty (7444)
  280LDY forty+1 (490C)
  290JSR osword (ECAB)
  300RTS (9F7D)
  310.parameighty EQUB 0 (A6C1
)
  320EQUD &FFFF (B6B6)
  330EQUB 1 (2524)
  340EQUB &69 (4D53)
  350EQUB &4F (70C3)
  360.paramforty EQUB 0 (B9B7)
  370EQUD &FFFF (2708)
  380EQUB 1 (2908)
  390EQUB &69 (60E2)
  400EQUB &27 (04FE)
  410] (2D05)
  420NEXT pass% (141E)
>
```

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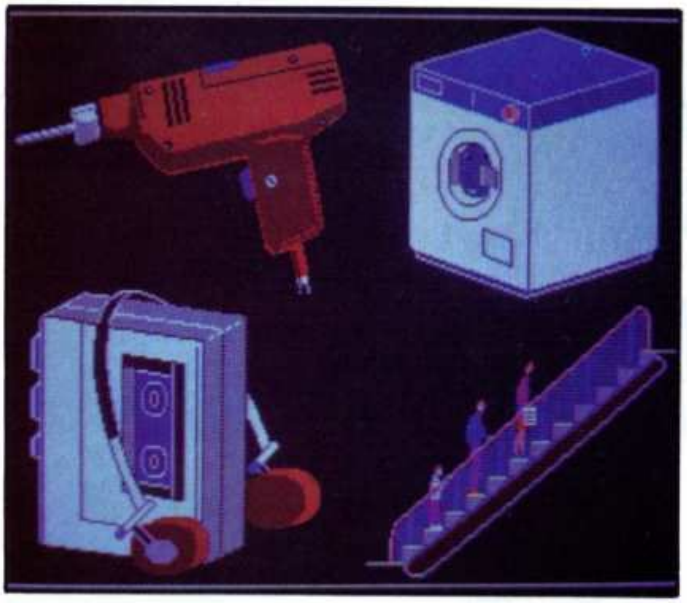
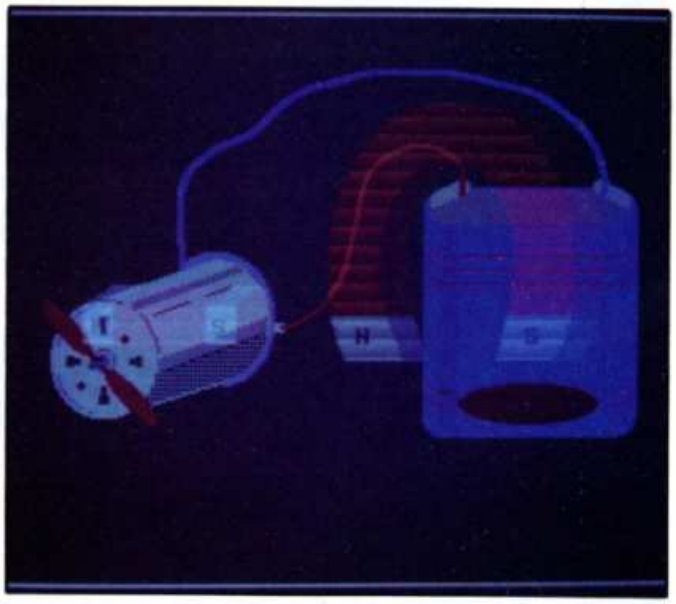
William Benjamin

# POWER UP





## Making The Most Of The Classroom Micro

The advent of the classroom computer has helped us discover new ways to facilitate the learning process. It has helped us to include areas of learning new to the curriculum and perhaps more importantly, offer some children access to the curriculum that traditional methods have barred. Without good software, however, the school micro whether it be an 8-bit BBC B, a 16bit Nimbus or a 32bit Archimedes is about as useful as the cassette recorder without tapes. It is important to regard the computer as a 'resource' to be integrated into the curriculum and not as a curriculum object in its own right. Important though hardware is, it is the core of sound, content-free software which forms a basis from which the micro can be launched into many areas of the curriculum. Further software purchases may include items which will enhance specific areas and enrich the learning experience. This month I shall discuss applications which range widely across the curriculum.

### Language

Traditionally, language work in the primary school has been not so much a curriculum area, but a medium of expression which pervades all aspects of school life. Any discussion on the use of computers and language development must adopt a catholic approach in which the micro is seen as a tool to enhance the growth of language across the curriculum. The classroom computer contributes to language development by stimulating discussion and logical thought in group, problem-solving situations. Word processing, LOGO, simulations and adventure programs provide four key areas of use.

Word processors provide a unique system for children's writing. Logotron's powerful *Pendown* package, Tedimen Software's child-centred *Folio* and Clwyd Technic's *Edword 2* represent three excellent writing environments. Each exemplifies the value of word processors in the classroom. Text entered via the standard QWERTY keyboard or a Concept Keyboard can then be easily edited, restructured and revised – skills which are not easily practised by any other means. Children enjoy the freedom to 'push and shove' words about a piece of text knowing that the final output will be far superior to anything they could do freehand.

Content-free software tools like *Developing Tray*, are especially useful. They pinpoint the structure and grammar of language because little graphical information is given. Children really do have to use semantic, syntactic and stylistic clues in order to complete a piece of text. Similarly, the program *Muddles* uses structural and linguistic clues to enable children to solve passages, sentences and words which have been deliberately muddled in a variety of ways. Both *Tray* and *Muddles* exemplify the value of the micro in language work as each provides a unique language experience.

### Desktop Publishing

Written activity leads naturally to the production of a class newspaper or magazine – especially helpful are *Pendown's* various fonts and printing styles. The production of a cut-and-paste newspaper introduces the area of desk top publishing leading to full on screen composition offered by software like *Typesetter!*. This area of expertise has probably been the one which has most grabbed the attention of users over the past eighteen months. The ability to handle text in defined columns, print it in a variety of point sizes and fonts and to integrate graphics has led many users to say that this is the ultimate tool for the computer. The problem is that although the idea is fine the output often leaves something to be desired. The nature of the printing technique – dot matrix printers – means that everything that is printed has a very jagged effect. Large text characters tend to look uneven, especially in those packages which allow you to manipulate their size. The anti-aliasing technique (removal of jagged edges) is just not possible on a BBC B because of memory restrictions.

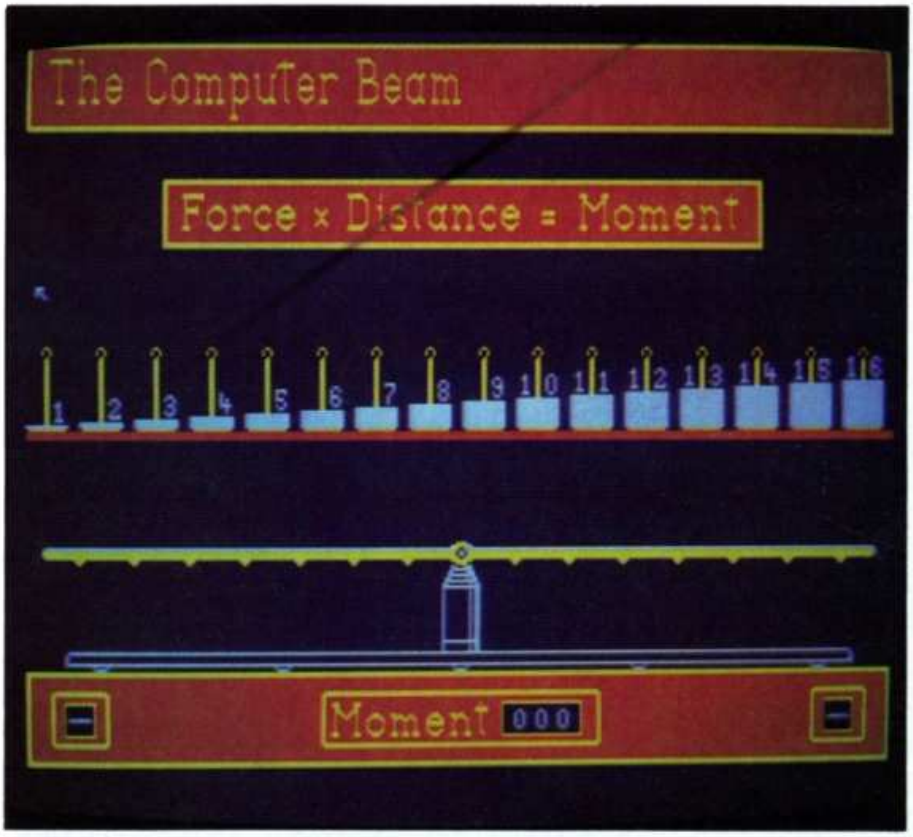
For that reason several organistions have honed down their product to produce excellent results insofar as the machinery will allow it, in specific types of use. So, for example, Sherston's Typesetter! has three

One excellent newcomer has been aimed at the primary age-range and specifically the infant age. *Fairy Tales* from Resource is a very easy to use package which allows children to create their own text and graphics "pages", either just on screen as an electronic book, or printed out. The stunning graphics and the simplicity of use are likely to make this one of the major infant packages of 1988.

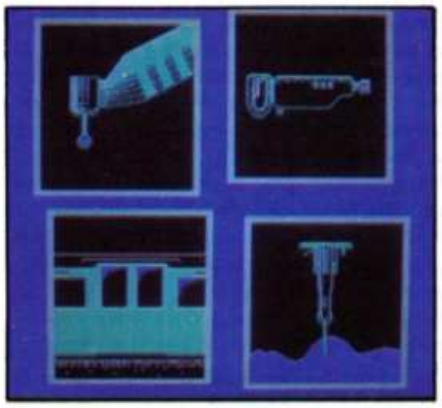
DTP is a tool which can fit into almost any area of the curriculum. Please don't feel that it is only for the production of newspapers! So many possibilities arise for high-quality printout in a school that it seems an essential tool for the software library.

LOGO encourages children to use language in a powerful and structured way. Although known best in the primary school for turtle graphics, LOGO is a powerful, computer language. The turtle environment is mathematical and requires precise language. From a core of primitives, the computer can be taught new commands which in turn, can be used in the definition of further commands. A robot or screen turtle then follows the series of commands. Perhaps the most important aspect of LOGO is that the child is in control of the computer and not vice-versa.

Unfortunately, many teachers are still shy of LOGO and are reluctant to explore its possibilities. Many teachers also underestimate the value of a robot turtle in the classroom. Most see it as a simple (and expensive), extension to the screen turtle. However, its impact on children can be immense. The thrill




headline sizes only and one font which means that the package maximises the printer's potential. Also they have no graphics facility – generally the weak spot of most DTP packs except where graphics libraries are included. AVP's *Pixel Perfect* has probably the best overall facilities since they admit they have studied everything produced by other companies and come up with the best aspects of those packages – a shrewd move! Wight Scientific's *Signwriter* which was mentioned in these pages in November '87 issue, has been targetted at a specific area of excellence – large font signs in very high quality dense print. As I said then, I have never before seen such printout from a dot-matrix printer although there is something of a time overhead in printing.



children get seeing their programs developing complex patterns and shapes on large sheets of paper which are then discussed and displayed, should not be underestimated. Similarly children gain immense satisfaction from seeing the robot obey their commands. A turtle provides real concrete experience in the school's LOGO programme.

**Simulations** offer a focus for the language programme. The micro and the simulation program can generate a rich, creative and imaginary world in the classroom : one that is difficult to provide any other way. It is a world of experimentation with ideas, of discussion, model building, and drama. It is a world where traditional drills-and-skills take second place – where the teacher takes on an advisory role and the micro is used to make the classroom an exciting and stimulating environment for children.

Simulations (like *Wagons West* and *The Great Plague-1665*), enable children to experience situations which cannot easily or safely be provided in the ordinary context of classroom based education. One of the main criticisms of simulation software is that although an attempt is made to base them on accurate mathematic models, the restriction imposed by the computer's often limited memory is such that the model is only partially accurate because the machine cannot hope to match anything approaching the full range of factors involved. Simplicity need not be a serious restriction, however. In the primary school non-specialist applications are the norm and the emphasis is more on group involvement, discussion and problem solving. Simulations can provide considerable enhancement of a topic and will motivate even the most reluctant of pupils.

**Adventure Software** also provides a basis for language activities. Fiction and fantasy give children unlimited access to exciting new experiences and unfamiliar emotions. Many teachers new to (or shy of), computers frequently underestimate the power of the software to motivate children. With properly planned and soundly organised work children can be successfully led into a rich imaginary world. Perhaps those that doubt the validity of using computers in this way perceive children 'having fun' at the expense of skill/concept development. Simply, this is not so. In the hands of the skilled teacher an enormous amount of learning can take place away from the micro.

Computer based adventure programs can generate a creative and imaginary world in the classroom. Experimentation with ideas, discussion, formulation and sharing of strategies, drama all feature largely in adventure programs too. For success the teacher must be prepared to adopt a managerial role. Resource packages like 4Mation's *Flowers of Crystal* and Sherston's *Wizard's Return*, provide materials which allow many children to work on the program simultaneously. This approach requires the teacher to be organised and committed to resource-based education which emphasises children actively learning and not teachers actively teaching. Immediately, you are faced with tricky problem : computer time. One or two micros per school is wholly inadequate in terms of run-

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database helps children to focus upon the interpretation of data.

With databases children learn to use the classroom computer to find information related to their particular needs. The value of any database lies in the deductions which children make, based on the implications that rapid 'intelligent' searches of their own collected data make clear. If children are allowed to create databases themselves as part of their project work it follows that they are likely to develop a much wider understanding of how to handle information.

There are essentially three types of databases used in the classroom. A viewdatabase (like *Communitel, Mikefax* and *Schoolfax*), stores information on pages and can be thought of as an 'electronic book'. Hierarchical databases like *Data Tree,* and *Animal,* are based on a tree structure. Arguably the most useful of all, are databases like *Grass, Superstore,* and *Junior Find.* With these software tools it is possible to find data by asking questions which impose conditions. Children make their observations, later to record these on the computer as well as in all the other media normally used in the classroom (painting, writing, modelling etc). Essential to the idea, is that the children's own observations are recorded under the headings that children themselves have selected as important.

ning most worthwhile software. However, most good adventures and simulations can be used in the context of a twice-weekly computer session.

## Mathematics

The computer can become a vital tool in the area of mathematical investigations. It is unfortunate that the area of mathematics has attracted some of the poorest software produced. Enough has already been said about drill-and-practice software for me to expound any further here. Sufficient to say, utilising the classroom computer just to practise tables really cannot be justified. Use Little Professors instead – children love them. How can the computer be used to maximum effect? In a good primary classroom the distinctions between mathematics and other subject areas are deliberately blurred. For example, when children use simulations like *Cars-Maths in Motion* considerable mathematical skills are being employed, although of course much other curriculum information and work is generated during the same process.

Where the school micro does have a valuable role in the mathematics scheme is in allowing children to investigate mathematical relationships in ways which are generally impractical by any other method. Frequently it is difficult to set up and monitor problem solving activities in a busy classroom. Here the computer can give fast and accurate responses to the childrens' actions. Cambridgeshire Software House's *Cars-Maths in Motion* and *Pathfinder* provide two typical examples of this type of software. Each can help children to find answers to their own questions and to develop problem solving skills: identifying the problem, planning a strategy, checking and refining the solution. Let's not pretend that there aren't obstacles to this open ended approach to learning. Many teachers find the adoption of problem posing, problem solving techniques difficult to implement in practice. This is not unexpected because utilising such an approach is quite difficult, especially for teachers who are perhaps not confident problem solvers themselves. Problem solving activities also tend to be very time consuming if done effectively. The classroom micro can offer a wide range of problem solving scenarios.

## Science

Science has been made a core subject area in the proposed National Curriculum. The computer's role in primary science is three fold:

1. Information retrieval
2. Monitoring and control
3. Simulating

## Information Retrieval

In 1981, The Cockcroft Report considered that children in schools spent a great deal of time collecting data but relatively little time in interpreting it. The use of a computer

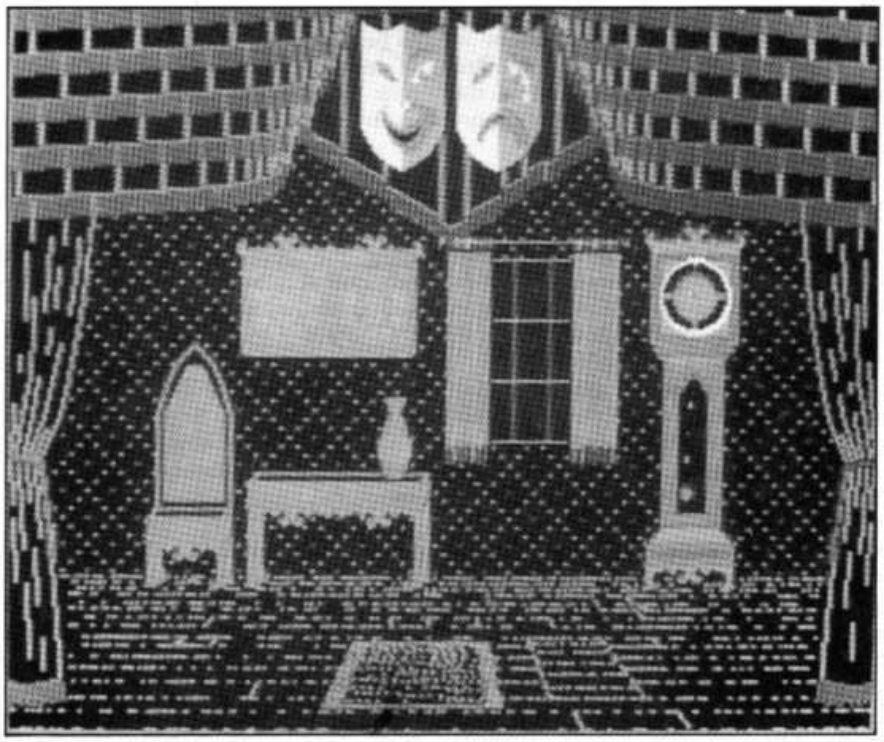
## Control

As robots become numerous and find varied roles in the world of adults so computer control, measuring and metering is gaining importance in the primary classroom. It is an area which, as yet, is sadly neglected. There are at least three ways you can use the school computer for control purposes:

1. As a sensor to read and display information from the outside world.
2. As a switching device controlling aspects of the environment under instructions from a program.
3. As an artificially intelligent device, still following program instructions, but in addition sensing and responding to changes in the environment.

Resources like *Timer* and *Meter* packs from Earo Soft promote a wide range of sensing and monitoring investigations and require very little computing knowledge to operate. Each positively encourages the experience of first hand discovery which is so paramount in children's learning. The value of using the micro to monitor events is that to the children the data collected is real and related to their direct experience not from an unrelated, vicarious source. Similarly, *Measure and Tell* from Clwyd Technics provides just about everything required for children to begin all manner of investigations into temperature changes. The software provides pupils with all they require to record, display, analyse and print out experimental data. Open-ended learning materials like these successfully integrate with a wide range of curriculum areas.

Robots provide a wonderful opportunity for children to experiment with computer control. They are an excellent means to illustrate the control potential of the computer; whether it be programming a *Trekker* to follow a predefined pathway or sending the BBC Buggy off to collect something with its grab-arm and to return it, or making a robot arm respond correctly to a series of related commands. Programming a robot really makes children think about what they are doing and why. If the robot does not respond as expected then they have to re-examine and revise their work. Children learn by this type of activity because their awareness, use of language and mathematical concepts are all enriched. Angles, movement, and directions become very real indeed. The whole learning process is enhanced. Robotic devices like a TREKKER buggy provide a foundation of concepts on the road to studies in control technology and artificial intelligence. There can be real scope for exciting, experimental applications.



## About the Computer

In many ways the last section is an aspect of studying the computer as well as using it as a resource for mathematics. Control technology is now so much part of our lives that we have become totally unaware of its importance. This needs to be remedied in the curriculum we teach so that children develop an awareness of the influences on their lives and the systems which allow us to process so much information in this information age. The "keyboard-less" computer may be seen in the washing machine and the central heating system, in the automatic charge-card reader and traffic control systems.

Simulating those devices in the classroom provides not only an understanding of their principles of operation but also gives a context for the solution of simple problems based upon real-life situations. How do you, for example, set up a system which identifies red parcels on a conveyor and transfers them to a truck which takes them to a storage depot, at the same time pushing blue parcels to the end of the line where they are returned to the beginning of the system and, at the same time, pushing parcels of any other colour into the dustbin? A silly problem? It exemplifies the type of sorting system that is part of any major production line.

There are many kits and systems which will allow this type of work to be undertaken – Lego, Fischer Technic, Meccano and so on, may all be controlled by a variety of buffer boxes and interfaces to the computer with a host of software. These will be discussed in next month's article at more length. More generally however, the BBC Soft package, *Design and Technology*, is a real winner in terms of multi-media overview of the world of technology. It includes not only computer programs which are only one aspect of the work, but also audio and video tapes as well as slides. This comprehensive pack is modular in nature and therefore may be used on a "pick and mix" basis with a number of age groups.

There are case studies of design problems and their relative success and failure – Sinclair's C5 for instance, and the design of a new all-terrain vehicle, there are simulations of systems which form parts of much greater entities – electronic control and pneumatic devices, gearing and linkages and interesting simulations of structures which the user may design on-screen to see if they are capable of supporting the loads and stresses for which they have been designed. This type of pack is invaluable as a resource in the secondary school and further education. Some modules are also appropriate for upper junior study – a case for co-operation between feeder and secondary schools.

## Business Studies

Business Studies is another aspect of computer use in the real world, this time much more related to the keyboard computer. An excellent overview of that area of technology is provided by Acornsoft's *Micros in Business* package which covers the main computer tools – word processor, spreadsheet, database – in a context of business use. It contains plenty of worked examples and perfectly useable examples of these tools. If you require just simple examples of the tools with interlinking facilities you will be hard pressed to find better value than *Mini Office II* from Database Publications.

## The Arts

When the computer first arrived on the educational scene it was assumed that it would hit only the maths and perhaps the science areas of the curriculum. For that reason many mathematics teachers in secondary schools were lumbered with an inordinate amount of extra work and responsibility when they were perceived as the logical computer person. It is interesting to note that, with a few exceptions, the provision of software for maths has been the most inadequate of all the curriculum areas. The Arts on the other hand, which most people initially thought were too open-ended for the computer, have become one of the main areas of computer use. Looking just at the creative arts – music and art and design – since we have already looked at language, there are many excellent instances of packages which complement the curriculum.

Those adventurous music teachers who have taken the technological bull by the horns have found that the impact upon children of al ages and abilities has been astonishing. Composition and music theory have suddenly become subjects open to all and indeed eagerly sought after by many who wish to emulate their rock and pop heroes. Naturally, this requires a high degree of tolerance on the part of the staff concerned who need a catholic outlook on the musical curriculum. As it becomes realised that it is just as valid to create beautiful and diverting sounds with a synthesiser as with conventional instruments so too it is also becoming realised that it is the right of all to be able to express themselves in this way. I have heard already of instances of most unlikely pupils progressing from an informal introduction to

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music via the BBC computer, a MIDI interface and a keyboard, to examinations in singing, piano or violin. This is another example of the liberating influence of the computer, bringing a little equality of opportunity to a previously cloistered subject.

If you are moved by that "purple patch" to look at the computer as a tool in music then have a glance at Mid Sussex Software's *Music Processor*. This will not magically turn your compuer into a full-blown synthesiser or anything like that – you will need to spend capitation for that sort of work! – but it will provide you with a flexible and powerful means of putting notes on paper. Not just that, this package also allows transposition of your score, will allow up to eight parts to be "composed" together, will also let you extract one part from the main score and treat it as a separate entity – great for producing orchestra parts, especially in conjunction with the transposition facility which has options for all instrumental variations. The editor also will tidy up your score if you have made it wander all over the stave in a disjointed way. It prints out and plays back. The best recommendation however is that it is produced by a company of music publishers who actually use it for producing their own scores. It has been used commercially and is therefore not only robust but also practical – give it a try! At £49.95 it won't break the bank.

## Graphics and Art

Graphics and Art has so many packages that it really is difficult to choose. If you want something which will allow you to play around with images, stretch and squeeze them, integrate digitised pictures and colour frameworks at will then your choice really has to be *Image* from Cambridge Micro Software. If you want flexible black and white drawing facilities and good-quality printout then you will find Clare's *Artroom* for the Master and Compact ONLY, hard to beat. Clares of course have also produced the excellent *Artisan* package for the Archimedes – more of that in a couple of issues' time.

## Special Needs

In this gloss over the entire computing curriculum we should not forgewt special needs. It is a fact that there is no greater utility for the computer than providing children with special needs – both educational and others – with the means to express themselves through the medium of new technology. Bearing that in mind it is astonishing to note that the government has decreed that the Special Education Microelectronics Resource Centres (SEMERCs) shall close at the end of March 1989 with no chance of reprieve other than through the initiatives of individual local authorities.

The Microelectronics Education Support Unit (MESU) has now published two major packages for special needs. *Prompt/Writer* is a double word processing package which allows concept keyboard and other devices to be used for input of text. A large amount of resource material is provided with this pack including a number of overlays. The other main package is *Windows*, a program for allowing the gradual revelation of parts of an overall screen image to take place. This image may be text or a picture and the idea behind the program's various options is to allow the development of intuitive and relational skills to take place with children with special needs.

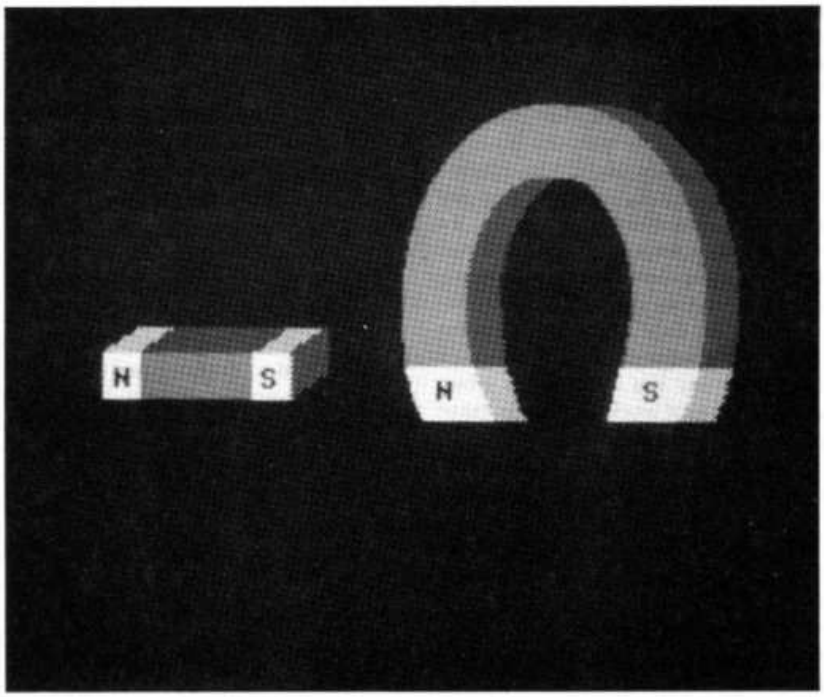
There is of course much much more than this generally available for special needs – particularly from your local SEMERC at Manchester, Redbridge, Bristol or Newcastle. Talk to them about how the computer can help you in a whole variety of subject areas.

## Conclusion

Just one sound piece of software from each area would help a school progress a long way in utilising its micro computer effectively. Some primary school teachers, for a variety of reasons, are still unaware of the power of the micro in facilitating learning. Each school needs to create a structure in which computer materials can be used across the curriculum – a system whereby the staff can communicate their computer experiences to their colleagues. All teachers need to understand the possiblities offered by computers to enhance children's learning and should be willing to 'have a go' themselves. Only by adopting a positive attitude will teachers facilitate the success of computing in the primary school.

It is my view that we now have at our disposal all the computing power we require in primary education for some time to come. If there should be one outcome from the promised millions Kenneth Baker has allocated to promoting microtechnology in our schools, I hope it will be in the area of teacher training and teacher support. It is time to slow down the rate of technological change in education. Hopefully, we will embark on an era of consolidation. An era where the creative and imaginative use computers in schools will be encouraged to flourish, whilst still providing a firm developmental base for new software products by supporting those organisations which have provided the many successful packages mentioned here and in others of my articles. Without this software the computer is useless – it is the lifeblood of the computer. The publishers work in a low-budget environment because of constraints on education spending. With continued government support the new materials and support packs will continue to arrive. Without that support it is likely that many software houses will become defunct within the next two years.

The government's earnest intent has been to make Britain the leader in educational computing. We now have a higher level of hardware than most other countries, innovative software that is the envy of every country and an insecure base for future development. Many publishers are now wondering where the next stage of funding will lead them. If future DTI Software Schemes are substantially below the level of previous years then it is likely that many well-known names will disappear, much to the surprise of the teachers who use their wares, but not to the surprise of the companies themselves. National Curricula need national support. I fervently hope that the government will not allow our support organisations to founder during the next year or so.



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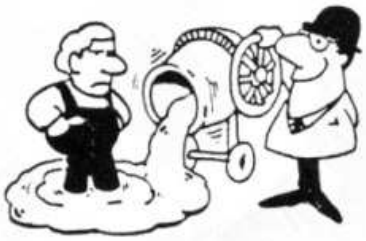

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2. Cleo and her husband take the third train to Canterbury.
3. Clint is a Cobbler.
4. Charles takes the train for Cambridge.
5. Candice is going to Charing Cross.
6. The Comic Artist takes the fourth train.
7. Clive takes the second train.
8. Chloe is married to the Chef.
9. Mr and Mrs Cooper are going to Charing Cross.
10. The Collins take an earlier train than Cathy and Husband.
11. The Clarendons take the first train.
12. Mr Claremont is going to Cheshunt.
13. The Cooper is going to Chichester.
14. The Claremonts take an earlier train than Mr Cobbler, the Computer Operator.
15. Colin's train is later than the Cooper
16. Mr Collins takes the train before the train before the Comic Artist.

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A special multi-file mode enables very long documents to be generated, even to the size of a disc, yet enables simple movement to any page in the document.

File selector for all file operations. This enables fast and very simple file name selection when saving, loading etc.

Integrates directly with other members of the INTER family and with SPELLMASTER, the fastest and most flexible spelling checker available for the BBC.

**BBC ROM £49+VAT (£56.35 incl.)**
**Archimedes ROM £39+VAT (£44.85 incl.)**

## INTER-**SHEET**

A simple to use, but very powerful spreadsheet program offering many unique features.

The fastest spreadsheet available for the BBC Micro.

The largest capacity spreadsheet. This means more data and larger spreadsheets are possible.

40, 80 and a special 106 column screen mode. Especially useful for viewing large sheets.

Multiple spreadsheets in memory at once. Data from one may be included in the calculations of other sheets.

Super-fast replication allows anything from a single box to an area of the sheet to be copied to any other position. Formulae may be automatically updated relative to their new positions.

Simple WORDWISE like cursor movement.

A unique windowing system enables any row or column to be fixed on screen, while allowing the sheet to scroll underneath. Simpler than other windowing systems yet more flexible.

While it integrates directly with INTER-WORD it can also transfer data to and from other word processors such as VIEW and WORDWISE.

A large range of standard maths functions is included in addition to special spreadsheet functions such as AVERAGE, COUNT, IF . . ., LOOKUP, MAX, MIN, SUM etc.

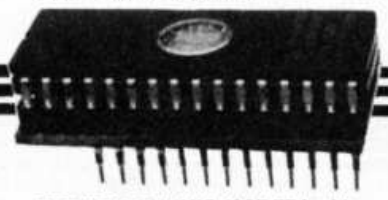
Simple auto-prompting commands structure. If you can't remember the complete command syntax, just enter the first letter and INTER-SHEET will prompt from then on.

**BBC ROM (2 chips) £49+VAT (£56.35 incl.)**
**Archimedes ROM £39+VAT (£44.85 incl.)**

**All the above ROMs are fully compatible with DFS, ADFS, Econet, all BBC machine variants and Watford or Aries shadow RAM boards.**

## MEGA 3—
### the single chip solution

A new single 1 megabit chip containing complete versions of all the above programs is now available. This replaces 4 chips and so offers a more compact and more economic way of obtaining the above three programs.



**BBC ROM £85+VAT (£97.75 incl.)**
**Archimedes ROM not yet available.**

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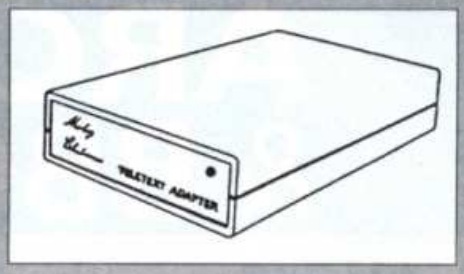
**Telephone 0442 63933**

# TELETEXT ADAPTER

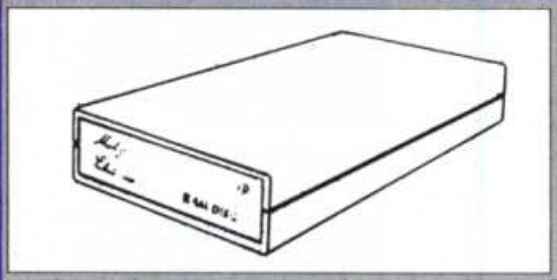


Would you like access to free high quality software and over a thousand pages of information, but Prestel access charges and phone bills too expensive? Then read on!
The answer is Teletext. Yes the same system everyone has seen incorporated into television sets, but with a difference. When Teletext is read by a computer you can actually use the data.
The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system.
With the Morley adapter you will get a state of the art unit that automatically tunes itself into the required station (no more messing around with screwdrivers or twiddling little knobs in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

**FEATURES:**
* Advanced design uses the latest technology, will handle ANY future enhancements to the Teletext system e.g.: full field; 8 bit data transfer; 2k pages etc.
* Simply plugs into the user port.
* Low power consumption, less than 200ma. Optional power supply available.
* User friendly menu driven software including extended OSCLI and OSWord commands for access from BASIC programs.
* Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.
* FREE Telesoftware, no access charges (updated weekly).
* Save selected pages to disc/tape for later retrieval.
* Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.
* Gives you a real-time clock at your disposal (*TIME).
* Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
* Easy to follow comprehensive user guides.
* No hardware limitations, it can for example receive virtually unlimited numbers of channels.
* Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).

**WHAT THE REVIEWERS SAID:**
"...In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."–*(Acorn User, January, 1986).*
"...The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."–*(A&B Computing, June, 1986).*
"...Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."–*(The Times Educational Supplement, September, 1986).*
**THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.**

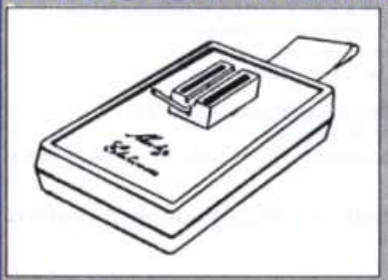
# RAMDISC



Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

**FEATURES:**
One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.
Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.

# EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.
This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

**THE HARDWARE**
The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.

**THE SOFTWARE**
The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.
The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS.
**Immediate delivery no quibble 12 month guarantee.**

# MASTER CARTRIDGES

**DUALS** – Designed and manufactured by Care Electronics to Acorn specifications. These high quality Master expansion cartridges will take two 16k sideways ROM's, and will, unlike similar cartridges available from other manufacturers, accept the new second generation programs, such as Computer Concepts Interword and Spellmaster ROM's.
**QUADS** – As Duals but take 4×16 Eprom.
These Cartridges come in a high quality, robust, formed-plastic case, that fits neatly into either one of the of Master's cartridge slots.

# MASTER SMART CARTRIDGE

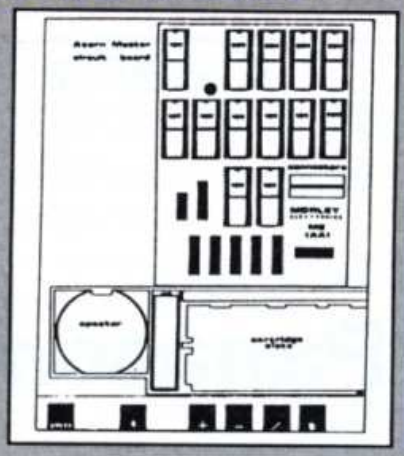
This device was designed and manufactured jointly by Morley and Care Electronics.
The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.
The **Smart** cartridge will prove useful to the novice, allowing him to do the simple things like dump any screen to printer, and made backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

**BUILT IN FEATURES (at the press of a button)**
Autosaves computer's entire memory.
Freeze program at any point.
Screen dump (any mode) to printer or disc.
Allows any OSCLI command without disturbing memory.
Copies 90% of protected software.
Tape to disc, disc to tape.
User friendly menu.
Sound On/Off.

**ALL CARTRIDGES COME WITH A 12 MONTH NO QUIBBLE WARRANTY**

NEW PRODUCT

# MORLEY MASTER BOARD 'AA'



MORLEY ELECTRONICS

Unit 3, Maurice Road Industrial Estate,
Wallsend, Tyne & Wear NE28 6BY
Telephone: Tyneside (091) 2627507

Telex: 265871 A/B MONREF G
(Quoting Mag 70211)

At long last the add-on all MASTER users have been waiting for, an internal ROM board.

No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.

The new **MORLEY MASTER BOARD "AA"** allows you to have up to 8x16k and 4x32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permanently, whilst retaining the standard 4 x sideways ram banks and four banks by using cartridges

**A staggering 32 ROM images installed and accessible at any time**

Included in the package is a utility ROM which has many useful features such as 'FICOPY', a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

So for less than the price of four external cartridges you get a MASTER BOARD "AA" which with twice the capacity has got to be **THE** ROM expansion for the serious MASTER user.

The unit comes with the usual Morley, full no-quibble twelve months warranty, and our usual after sales service

# THE COMPLETE RANGE OF TELETEXT SOFTWARE from M/B SOFTWARE

***NEW . . . DESIGN 7 PLUS** – now 'the best' is even better. Held in high regard by reviewers and hundreds of satisfied owners, DESIGN 7 has been further improved, with revised keystrip & even more features. Design/load/save and MODE 7 screen with ease, up to full CEEFAX/Oracle standard. Will convert ANY MODE 7 screen to a BASIC procedure, for inclusion in your own programs. ROM version includes a file copier, printer dumps useable from BASIC etc. B/MASTER/COMPACT.

**TELETEXT EMULATORS/SCREEN DISPLAYS/INFORMATION SYSTEMS** – A complete range of teletext programs to cater for all needs, with full teletext adapter interfacing.

***NEW . . . DESFAX** – totally new version – streets ahead of the competition – run your own information/display system. Stores hundreds of screens on dual 80 track drives (96 screens on single-sided 40 track), with access to any screen with a SINGLE KEYPRESS. Lots of special effects – screens can scroll, slide, overwrite etc. Animation, loops, subroutines – send for details – not enough space here to even begin to describe the advanced features!! B/MASTER/COMPACT

***NEW . . . MASTERFAX** – 84 MODE 7 screens in memory at once. 148 screens possible with cartridge RAM. An advanced teletext/carousel program featuring SINGLE KEYPRESS or 3-digit page selection. Runs entirely from memory – no disc accesses after pages are loaded. Superb animation and other effects. MASTER/COMPACT only.

***NEW . . . VU-FAX** – 1000 screens and no disc accesses! Screens stored on MORLEY 1MByte RAM DISC. SINGLE KEYPRESS gives instant access to any screen (or emulate teletext). This is the ultimate MODE 7 screen management system – there is nothing else like it. MODEL B/MASTER 128.

***ALSO . . . MASTERcopy** – DFS/DFS, DFS/ADFS, ADFS/DFS, ADFS/ADFS file copier. Uses the MASTER 128's memory to the full to permit fast disc copying. 31 DFS files to ADFS disc in less than 2 minutes. Creates directories automatically. You will wonder how you ever managed without this program. Described by reviewers as 'unexcelled'. MASTER 128 and COMPACT's fitted with DFS ROMS.

## ORDER FORM

**To order simply complete and return by post enclosing your cheque/P.O. made payable to Morley Electronics, or by phone during office hours, quoting your ACCESS or VISA number.**

Morley Electronics, Unit 3 Maurice Road Industrial Estate, Wallsend, Tyne & Wear NE28 6BY Telephone Tyneside (091) 2627507.
Telex: 265871 A/B MONREF G (Quoting Mag 70211)

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Jonathan Evans



# THROUGH THE SIDEWAYS WINDOW

I have a confession to make. I have recently been making quite a lot of use of the Apple Macintosh SE (shame on you! – Ed) with its fascinating WIMP environment. I have also recently upgraded my Master 128 with the 512 co-processor which supports the copy-cat GEM system – impressive by itself, but still not as good as the Mac. Acorn have also put a powerful window management system into the Archimedes, but what of the poor old BBC users? Can they have a touch of the windowing environment themselves? The answer is yes – to a limited extent at least – provided you have significant amounts of sideways RAM available.

As users of Computer Concepts' *Inter-Word* or any AMX software will know, it is quite possible to have pull-down menus or dialogue windows on the BBC micro. These are windows which are placed over the working screen to allow choice of options, with or without text entry, and which are then 'removed' – that is the screen is restored to the precise state in which it appeared prior to the presence of the window.

In this article, I will provide a demonstration of how such a facility can be incorporated into BBC BASIC programs written for the Master series computers and present procedures which can be exported directly to your own applications.

## Demo program

The demonstration program listed creates a moire pattern on a Mode 128 (shadow mode 0) screen and prompts the user to press a key. On doing so, a window is drawn in the top left of the screen. Further key presses lead to the drawing of second and third windows, overlapping each other and leading to the screen display shown now for the clever bit. Pressing a key now removes Window 3 by restoring the screen exactly to the state it was in after Window 2 was drawn. Further key presses remove Windows 2 and 1 respectively, so that we are back to the original background. Furthermore each window, when first created, is an active text window which could be used for printing messages and/or accepting input from the keyboard.

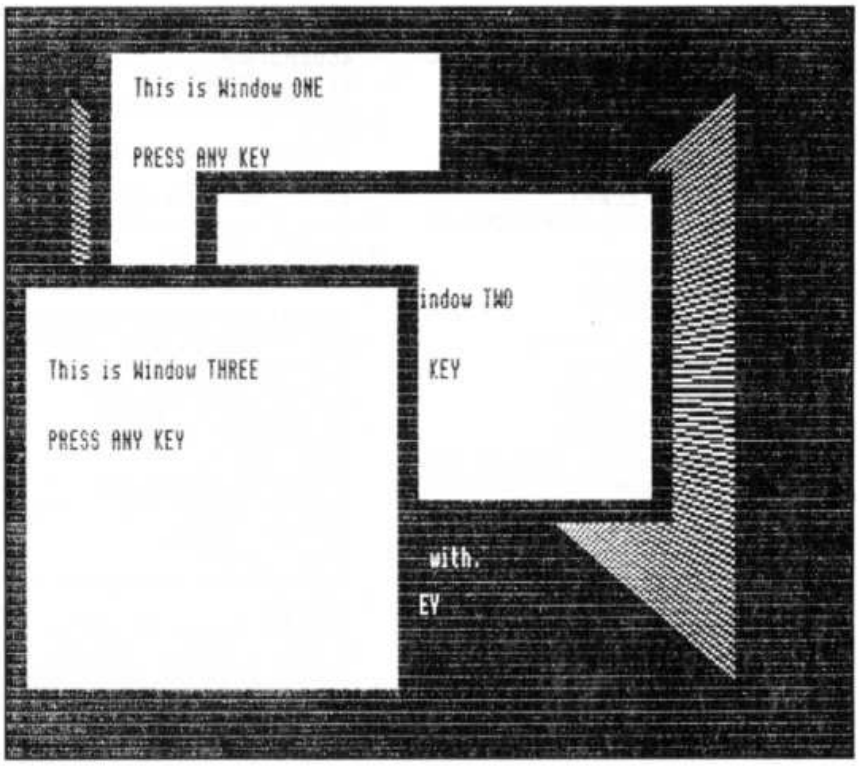
So how is this done? Way back in the September 1986 issue of A&B, I discussed the use of sideways RAM as a data storage area for BASIC programs written on the B+ and Master series. I pointed out that the Acorn MOS commands for use of sideways RAM made use of this facility both simple and very fast and that no machine code programming was required. One of the uses that I mentioned, but did not provide an example listing for, was the saving of the current graphics screen. This is the method used in the current program to achieve removable windows (although the procedures do have other applications). Prior to drawing a window, the entire state of the current screen – text and graphics – is copied into sideways RAM. Removing the window is achieved by simply copying the last save of the screen back into the main screen memory. Unlike saving and restoring a screen from disc this happens silently and very swiftly creating the desired illusion of a window being peeled off to reveal what is underneath.

## Programming methods

In order to use sideways RAM as for data storage, it is first necessary to configure for data storage using the *SRDATA command. This is done in PROCinit for all four 16K banks. Thereafter, the sideways RAM area can be treated as a contiguous block of 64K with 'pseudo-addressing' from 0 upwards. After the background scene is drawn it is saved to sideways RAM using PROCsave-screen. This procedure accepts a parameter in the range 1 to 3 since there is enough room to save three different screens. The parameter is used to compute the start address of the sideways RAM area before shifting the screen memory across by use of the MOS *SRWRITE command.

A complication arises due to the use of a shadow screen mode (128 in the example). In order to access the screen memory the command *FX108,1 must be issued which switches shadow RAM into the main address map. Once in this state, however, the screen is likely to be corrupted by any BASIC command making use of dynamic memory. That is why the string required by OSCLI to perform the correct *SRWRITE command is passed by indirect reference to a static string – $stringbuff – and also why normal addressing is immediately restored by *FX108,0.

The windows are created by PROC-window which accepts the usual bottom-left and top-right co-ordinates for creating a text window via VDU28. However, the procedure first creates a larger window which it clears to black and then the window specified – cleared to white – in order to create the impression of a border. The inner area created is a standard text window which can



be used for dialogue with the user.

Removal of the three windows is achieved by use of PROCrestorescreen which works in a a similar manner to PROCsavewindow except that it uses *SRREAD to read the data back from sideways RAM. The whole demonstration is run by PROCwindowdemo.

## Possible extensions

The procedures given provide only a text window for the common dialogue type of application. However, if you want to display graphics in your removable window you only need a small extension to PROCwindow which computes the graphics co-ordinates equivalent to the text ones given and creates a graphics window of the same size and location. Also in the program as written the windows are only 'active' when first created and not after restoration of the screen by removal of windows above. This can easily be remedied by storing the co-ordinates of each window and issuing an appropriate VDU28 command after restoring each screen.

The procedures supplied for saving and restoring the whole screen to sideways RAM may be useful for many purposes. For example, you might want to make a help screen of some sort available to the user – say a command summary list or a map for an adventure game. Such a screen could be drawn in advance and saved to one of the sideways RAM slots. If you don't want the user to see the screen being created just use VDU19 to switch all logical colours to black until after it is saved and the screen cleared. Whenever the user needs to see the help screen a special key press will lead to the current screen being saved into a second sideways RAM slot and the help screen restored to the current graphics memory. After viewing, the user can then return to original task with the screen restored to its previous state.

The whole screen save is the simplest, but obviously not the most efficient means of achieving the removable window effect demonstrated here. Strictly speaking it is only necessary to save the portion of screen memory to be covered by the window. This, however, will not be a contiguous block of memory and the save procedure would need to compute the area of the memory map corresponding to each line of the window and save it by a series of *SRWRITE commands. One obvious benefit of such a procedure would be to enable more windows to be saved by using memory more efficiently.

A more powerful window management system would also require procedures for saving the windows themselves which could be achieved by the use of the procedure described above after as well as before drawing the window. By this means you could, for example, animate a window with its contents intact across a preserved background screen of any kind. Essentially this would involve saving the background (or that portion to be covered), drawing the window, saving the window, restoring the background, drawing the window in the new position etc. In principle it should be possible to achieve other Mac-like effects of resizing windows and bringing active windows to the front entirely within a BBC BASIC program although the total number of windows that can be handled will obviously be limited.

```
   10REM Program to create rem
ovable text windows (82EE)
   20REM using Sideways RAM on
 B+ & Master series machines (
C988)
   30REM (461C)
   40REM Jonathan Evans, May 1
988 (07E9)
   50: (E79C)
   60MODE128 (ADD5)
   70PROCinit (4214)
   80PROCdrawbackground (3134)
   90PROCwindowdemo (397E)
  100CLS (2CFF)
  110END (7E74)
  120: (884A)
  130DEFPROCdrawbackground (50
BA)
  140xl=100:xr=1100 (56E5)
  150FOR y = 100 TO 900 STEP 1
2 (F61A)
  160yl=y:yr=1000 - y (CB1C)
  170MOVE xl,yl: DRAW xr,yr (C
BA6)
  180NEXT y (BD68)
  190PRINT TAB(22,7);"This is
the background scene" (36E7)
  200PRINT TAB(26,23);"that we
 start with." (ECA6)
  210PRINT TAB(28,25)"PRESS AN
Y KEY" (CA35)
  220PROCkey (6E23)
  230ENDPROC (B844)
  240: (7376)
  250DEFPROCinit (C8AB)
  260*SRDATA W (940E)
  270*SRDATA X (863F)
  280*SRDATA Y (9E01)
  290*SRDATA Z (2F67)
  300REM initialise 64K of sid
eways RAM for pseudo-addressin
g (675B)
  310REM as a data storage are
a (CC6E)
  320stringbuff=&900 (7CA7)
  330ENDPROC (0D9C)
  340: (7743)
  350DEFPROCsavescreen(N%) (49
2B)
  360IF N%<1 OR N%>3 THEN PROC
error("1 to 3 screens only per
mitted") (6411)
  370REM saves high resolution
 screen (MODE 128,129,130) (71
02)
  380REM to Sideways RAM. A ma
ximum of three screens may be
(B967)
  390REM saved at one time, in
dexed by N% (6CCA)
  400swaddr=&5000*(N%-1) (F8FC
)
  410$stringbuff="SRWRITE 3000
 +5000 "+STR$~swaddr (8FEE)
  420*FX108,1 (295B)
  430OSCLI($stringbuff) (FF26)
  440*FX108,0 (D50D)
  450ENDPROC (C1C0)
  460: (D928)
  470DEFPROCrestorescreen(N%)
(508F)
  480COLOUR128:COLOUR1:VDU26 (
3D51)
  490IF N%<1 OR N%>3 THEN PROC
error("1 to 3 screens only per
mitted") (4EC1)
  500swaddr=&5000*(N%-1) (E4A6
)
  510$stringbuff="SRREAD 3000
+5000 "+STR$~swaddr (14B0)
  520*FX108,1 (F8F8)
  530OSCLI($stringbuff) (5FD6)
  540*FX108,0 (04AE)
  550ENDPROC (7418)
  560: (DD1D)
  570DEFPROCerror(T$) (030C)
  580CLS:PRINT''T$ (3694)
  590END (E8DB)
  600: (2621)
  610DEFPROCwindow(lx,by,rx,ty
) (F447)
  620REM This procedure is set
 up for a Mode 0 screen (176D)
  630IF lx<2 OR by>30 OR rx>77
 OR ty<1 THEN PROCerror("No ro
om for border") (B855)
  640VDU28,lx-2,by+1,rx+2,ty-1
:COLOUR 128:CLS (00C3)
  650VDU28,lx,by,rx,ty:COLOUR1
29:COLOUR0:CLS (9635)
  660ENDPROC (48DA)
  670: (8832)
  680DEFPROCkey:OSCLI("FX15,1"
):REPEAT UNTIL GET:ENDPROC (48
86)
  690: (F457)
  700DEFPROCwindowdemo (81E4)
  710PROCsavescreen(1) (B695)
  720PROCwindow(10,10,40,2) (1
605)
  730PRINT'"  This is Window O
NE "''"  PRESS ANY KEY" (D005
)
  740PROCkey (E98C)
  750PROCsavescreen(2) (6F25)
  760PROCwindow(20,20,60,8) (9
AB6)
  770PRINT TAB(10,4);"This is
Window TWO " (6BA6)
  780PRINT TAB(10,7);"PRESS AN
Y KEY" (DF10)
  790PROCkey (C34A)
  800PROCsavescreen(3) (53A6)
  810PROCwindow(2,28,36,12) (7
4C4)
  820PRINT''"  This is Window
 THREE" (C086)
  830PRINT''"  PRESS ANY KEY"
(79FB)
  840PROCkey (8FCE)
  850PROCrestorescreen(3) (F8F
3)
  860PROCkey (0C80)
  870PROCrestorescreen(2) (0A2
B)
  880PROCkey (E4AF)
  890PROCrestorescreen(1) (DFD
0)
  900PROCkey (1CC9)
  910ENDPROC (CAAE)
>
```

# Watford Electronics

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**Memory**
The Z88 comes with 32K of RAM built in, of which around 20K is available – enough for about 2,000 words of text. This is easily expandable to 416K by simply slotting in additional RAM packs (see back cover). With the introduction of soon-to-be-released 1 Mbyte packs, total RAM of 3 Mbytes will be available – enough to hold the complete works of Shakespeare.

**Keyboard and display**
The Z88 has a full QWERTY keyboard with virtually silent, short-travel keys. It includes special function keys, such as ◇, □, INDEX and MENU which make it exceptionally easy for novice users to quickly find their way around the sophisticated built-in software.

The screen is a state-of-the-art supertwist LCD, which provides a massive improvement on normal displays in both contrast ratio and viewing angle – providing a clear, sharp read-out. The screen's format is 8 lines×106 characters, and provides a large working area of 8×94.

The remainder of the screen area consists of sections which hold menu details (including all the Z88's commands); a unique page map (which shows you where you are on a complete page); diary date; filing and directory details; and operating system details which give you information on the Z88's status (such as battery strength).

**Software**
The Z88 comes with a built-in suite of applications software, which is exceptionally capable, yet extremely easy to use.

The operating software, OZ, allows you to switch between, for example, word processing and spreadsheet applications – without the delay of loading separate disk-based software into the computer's memory. With the Z88, it's just a matter of pressing a couple of keys.

Built-in applications software includes *Pipedream*, which features word-processing, spreadsheet and database functions.

*Word Processing* Facilities include block marking and movement, searching and replacing, and multi-column layout. The display is fully WYSIWYG (What You See Is What You Get), showing bold, italics, underlining, centering, and dynamic page breaks as they appear on the printed page. Each page of the document is represented by a page map which shows the layout of the text.

*Spreadsheet* Invaluable for financial planning, this application allows you to define a series of formulae within cells (where a row and a column meet) and then to enter a series of numerical variables for manipulation. It allows profit and loss, cashflow and budgets to be quickly and easily arrived at.

*Database* This works on the same principle as spreadsheet – so data being stored for later retrieval is held in a known cell where it can, for example, be manipulated into ascending sequence.

*Diary* The Z88 diary software is a free-form log that can be configured in any way you choose, within the constraints of the Z88's memory. It's particularly useful when used with the Z88's calendar and clock to find dates and set alarms.

*Popdowns* include a powerful calculator, clock, calendar and alarm. A printer editor allows you to configure Z88 codes to match a wide range of printers, and to store printer definitions if you're using more than one type.

*Resident programming language* is BBC BASIC with assembler. Communications to the outside world are achieved using a VT52 terminal emulation mode or the Import/Export facility which allow transmission and receipt of data files between the Z88 and other PCs.

**Power supply**
The Z88 runs on four commonly available AA batteries, which provide around 20 hours of active computing, or a year on standby mode. Switching off puts the Z88 into standby; all data in RAM stays live, drawing minimal power from the Z88's batteries. And when the batteries need to be changed, a special capacitor (or the mains adapter) preserves the data.

CONTINUED ON LAST PAGE OF ADVERT ▶

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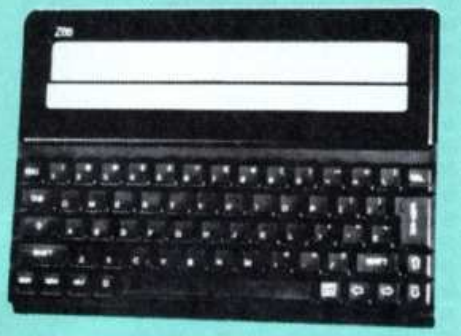

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# CO-PRO Adaptor

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## TYPES OF PLOT OUTPUT

Top and bottom track artworks, top and bottom silkscreens, solder resist mask, drilling detail drawing and check plot. All these may be with pad holes on/off, scale of 2:1 or 1:1, board edge on/off, 90 degres rotation, mirror image, width of pen, x & y offsets and batch plots to disc.

The above is only a taste of the superb features of this software, surely capturing previously unknown performance from the BBC Master computer. BBC B owners will need to fit at least one block of sideways RAM, Shadow screen memory and a disc drive. A trackerball or a mouse is also required.

BBC PCB Designer is supplied on a 32K PAL PROM and comes complete with two discs and a comprehensive manual containing examples and useful information on PCB design.

By the way, as a bonus, PCB Designer is also suitable for many other schematic drawing applications such as circuit diagram drawing.

**Introductory Offer: £99**

(Please write in for further technical details)

## SPECIAL OFFER

EPROMs for BBC's Sideways ROMs

**2764-250nS £3.00**
**27128-250nS (12V5) £3.25**
**27128-250nS (21V) £4.50**

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

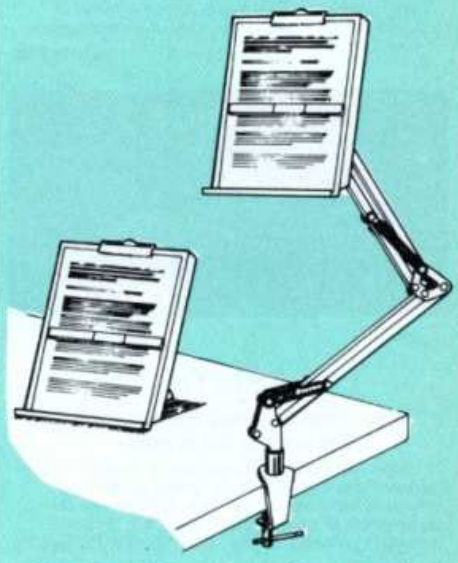
**6264LP (8K) £2.75**
**2 × 6264LP (16K) £5.30**

## PLINTHS FOR BBC MICRO, MASTER & PRINTERS

Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

| | |
|---|---|
| SINGLE BBC PLINTH | **£11** (carr. £1.50) |
| DOUBLE BBC PLINTH | **£19** (carr. £3.00) |
| PRINTER PLINTH | **£10** (carr. £1.50) |
| SINGLE MASTER PLINTH | **£14** (carr £1.50) |
| DOUBLE MASTER PLINTH | **£24** (carr £3.00) |

# COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only

Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

**Continued**

**All Monitors are supplied complete with BBC connecting leads FREE.**

## MICROVITEC 14"

- 1431 – Standard resolution as used on the BBC television computer programme **£175**
- 1451 – Medium resolution, suitable for word processing in mode 0 **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro **£359**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
- **2030 CS 20" Med Res** **£380**
- **2040 CS 20" Hi Res** **£675**
- Dust Cover for Microvitecs **£5.50**
- Touchtec 501 Touch Screen **£239**

## TAXAN 12" & 14"

- **TAXAN Super Vision 2 Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing **£269**
- **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£319**
- **TAXAN 14" Multisync 770 Plus** – An autoscanning Ultra high res, colour monitor. Ideal for Archimedes **£495**

- **NEC JC-1401P3EE 14"** Multisync Ultra Hi-res Intelligent Colour monitor. Auto scans frequencies between 15KHz to 35KHz. Text switch provides 7 colours for Database & wordprocessor. **£495**

- **Philips BM7542 12" Paper White**
  Attractively finished high res monitor. Has an etched glass anti-glare screen and a tilt stand for optimum viewing angle. 1000 x 850 pixels resolution coupled with high contrast makes it ideal for both word pro and graphics. The paper white display is ideal for DTP and CAD. Has a Video/Audio input. **Only £65**

## STAR BUY

- **PHILLIPS 14** Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

**ONLY £195**

## ZENITH

**"Now Test Bureau Recommended for use in Education"**

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Sys.)

- **Green (New Design) Hi-resolution** **£66**
- **Amber (New Design) Hi-resolution** **£70**

**N.B.** carriage on Monitors **£7** (securicor)

**SPARE LEADS**

| | |
|---|---|
| **BNC Lead for Zenith or Philips** | **£3** |
| Skart Monitor Lead | **£5** |
| RGB lead for TAXAN Monitors | **£3** |

## SWIVEL BASES

**for Video Monitors**

Our professional type swivel bases have front adjustable control. This alleviates the need to lift the monitor when adjusting the viewing angle.

for 12" Monitors **£9** (carr. £2.50)

for 14" Monitors **£12** (carr. £2.50)

## Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. Hundreds of these screens are in daily use in various branches of one of the leading High Street banks.

**£12**

## Acorn-Olivetti JP101 Ink Jet Printer

One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only **£59**
(Offer valid while present stocks last)

**JP101 accepts 9½" standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard – print speed 50 cps.**

Pack of 4 refills **£12**

**Screen Dump ROM for JP101 £11**

## Panasonic KX-P1081

Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLQ mode. Character width range from 5 cpi to 17 cpi. Upto 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.

***(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).***

Special Price: **£145** (carr. £6)

Optional RS232 Interface: **£39**

## Panasonic KX-P1082

This superb printer is very similar to the popular KX-P1081 printer but at 160 cps (40 cps in NLQ), a lot faster.
(Our LOW price also includes £35 worth of FREE BBC Cable and Dump Out 3 ROM).

Introductory Offer: **£172** (carr. £7)

## Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional. logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A printer of similar spec could cost a lot more than our ridiculously low price of:

Only **£234** (carr. £7)

| | |
|---|---|
| Single Sheet Feeder | **£175** |
| Tractor Feed | **£90** |

**FREE 32K extra Printer Buffer with every KX-P3131 purchased from us this month.**

## NEC P2200 PINWRITER

24 pin head; 168 CPS, LQ 56 CPS, 8K Buffer, Tractor/Friction feed. Numerous typefaces.

**£285**

Cut Sheet Feeder **£59**

## NEC P660 PINWRITER

24pin; 216 CPS, LQ 76 CPS, 8K Buffer

**£425**

## VARIOUS PRINTERS & ACCESSORIES

| | |
|---|---|
| Brother HR15 RS232 Daisy Wheel | **£275** |
| Brother HR20 Daisy Wheel | **£349** |
| HR20 Tractor Feed Attachment | **£110** |
| Epson EX800 Printer | **£395** |
| Epson EX1000 Printer | **£539** |
| Epson FX800 Printer | **£295** |
| Epson FX1000 Printer | **£399** |
| Epson LQ500 Printer | **£275** |
| Epson LQ800 Printer | **£399** |
| Epson LQ850 Printer | **£439** |
| Epson LQ1050 Printer | **£529** |
| Epson LQ2500+ Printer | **£790** |
| Epson LX800 Printer | **£186** |
| Epson SQ2500 Printer | **£975** |
| Epson Paper Roll Holder | **£17** |
| EX800/1000 Colour Option | **£55** |
| EX800/1000 Colour Ribbon | **£18** |
| EX800 Cut Sheet Feeder | **£130** |
| EX1000 Cut Sheet Feeder | £195 |
| FX/LQ/LX800 Single Sheet Feeder | **£135** |
| FX/LQ1000 Single Sheet Feeder | **£169** |
| Hi-80 Refills – Set of 4 Pens | **£7** |
| LX800 Cut Sheet Feeder | **£75** |
| LQ800 Tractor Feed | **£44** |
| LQ1000 Tractor Feed | **£50** |
| LQ2500 Cut Sheet Feeder | **£195** |
| LX1000 Cut Sheet Feeder | **£305** |
| **Hitachi 672 Colour Plotter** | **£475** |

**(Securicor Carriage on Printers £7**

## EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

| | | | |
|---|---|---|---|
| RS232 | **£27** | RS232 + 2K Buffer | **£52** |
| IEEE 488 | **£65** | RS232 + 8K Buffer | **£62** |

## KAGA/TAXAN PRINTERS

**(IBM/Epson compatibles)**

| | |
|---|---|
| Kaga KP815 Printer | **£249** (carr £7) |
| Kaga KP915 Printer | **£350** (carr £7) |
| RS232 Interface | **£49** |
| RS232 Interface with 2K Buffer | **£69** |
| RS232 Interface with 16K Buffer | **£89** |

## INTEGREX COLOUR JET PRINTER

- Colour Jet 132 Printer **£525**
- Paper Roll **£6**
- Screen Dump Software **£10**
- Colour Cartridge **£14**
- Black Cartridge **£8**
- 100 A4 OHP transparencies **£55**

## PRINTER SHARERS

**(Ideal for School environment)**

| Connects | Serial | Centronics |
|---|---|---|
| 2 BBC Micros to 1 Printer | £25 | £27 |
| 3 BBC Micros to 1 Printer | £36 | £35 |
| 6 BBC Micros to 1 Printer | – | £99 |

## PRINTER CHANGER

3 Printers to 1 Micro (Centronics) **£65**

**(Cables extra, specify type required when ordering)**

## Professional Printer Stand

This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

**£26** (carr. £2.50)

## THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

**£5.95** (No VAT)

## PRINTER LEADS

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA, Panasonic etc. printers.

| | |
|---|---|
| Standard length (4 feet long) | £6 |
| Extra long (6 feet long) | £8 |
| Compact's Special Centronics Lead | £9 |
| RS232 Cable | P.O.A. |
| IBM Parallel 1 metre Cable | £7 |
| Double ended 36 way Centronics Lead | £9 |

## PRINTER RIBBONS & VARIOUS DUST COVERS

| Type | Ribbons | Dust Covers |
|---|---|---|
| **BBC Micro** | – | £3.50 |
| **BBC Master** | – | £4.00 |
| **Archimedes Micro pair** | – | £9.00 |
| **Brother HR15/20** | £3.00 | £5.00 |
| **EX/LQ800** | £7.50 | £4.50 |
| **EX/LQ1000** | £8.00 | £5.00 |
| **RX/FX80/85/800/MX80** | £4.00 | £4.95 |
| **RX/FX100/1000** | £7.00 | – |
| **Kaga/Texan KP810/815** | £5.25 | £4.00 |
| **LQ2500** | £9.00 | £5.50 |
| **LX80/86** | £4.00 | £4.50 |
| **LX800** | £4.00 | £4.75 |
| **M1009/GLP** | £4.00 | £3.75 |
| **Panasonic KX1080/81** | £4.50 | £4.75 |
| **SQ2500** | £25.00 | £5.50 |
| **Star NL10** | £4.00 | £4.50 |
| **Microvitec Metal** | – | £5.50 |

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

## Listing Paper (Perforated)

- 1,000 Sheets 9½" × 11" Fanfold Paper £7
- 2,000 Sheets 9½" × 11" Fanfold Paper £12
- 1000 Sheets 9½" x 11" NCR 2 Part Fanfold £19
- 1,000 Sheets 15" × 11" Fanfold Paper £9
- 1000 Sheets true A4 Fanfold Paper £11
- 2000 Sheets true A4 Fanfold Paper £20
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

## PRINTER LABELS

**(On continuous fanfold backing sheet)**

| | |
|---|---|
| 1,000 90 × 36mm (Single Row) | £5.00 |
| 1,000 90 × 36mm (Twin Row) | £4.90 |
| 1,000 90 × 49mm (Twin Row) | £7.50 |
| 1,000 102 × 36mm (Twin Row) | £6.25 |

Carriage on 1,000 Labels £1.00

## MEGABUFFER 256

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

**Only £125** (carr £2)

## *OFFICE MASTER*

**CASHBOOK** – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

**FINAL ACCOUNTS** – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

**MAILIST** – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

**EASILEDGER** – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

**INVOICES & STATEMENTS** – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

**STOCK CONTROL** – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

## *OFFICE MATE*

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

**DATABASE** – Set up a computerised card index system with powerful search facilities.

**SPREADSHEET** – Offers many calculation and editing features.

**BEEBPLOT** – Provides visual representation from Spreadsheet data.

**OFFICE MATE Only £10** (Disc)

## New Launch Offers
### Disc Drives DP35-800S

A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25 inch disk drive is 40/80 track switchable, and has its very own power supply running independently of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

## OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£139**

| | |
|---|---|
| BBC Screen Dump | £10 |
| Colour Ribbon | £6 |
| Black Ribbon | £6 |

## 30 Megabyte Winchester Drive

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a full user guide and full utilities including file copy, 1000K save routines, Format and Verify – in fact all you need and more.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

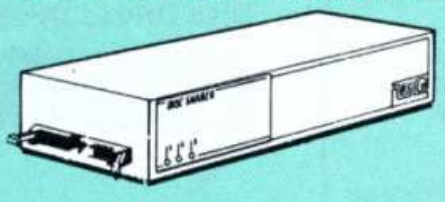
Compatible with the Master, and the BBC B (with 17"X disc interface).

Launch Offer **£425** (Carr. £12)

**Panasonic KX-P1083**
**Fast 240CPS (48CPS NLQ);**
**8K Buffer, Epson compatible, etc.**
**Launch Offer: £299**

NEW

# DISC DRIVE SHARER



## (Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£59** Price includes 3 Cables

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## NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

## WATFORD's & ACORN's SINGLE DENSITY DFS

*Watford's popular and widely acclaimed DFS has now been available for five years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.* ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£78**
- *Acorn's 0.90 DFS Kit complete* **£79**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

  *(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).*
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**

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NEW

## WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our MkII DDFS board has been adapted to allow the use of Acorn ADFS as well.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

## SPECIAL DISC DRIVE/DDFS OFFER

**Type CLS400**

- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£130** (£6 carr)
(Offer valid while stocks last)

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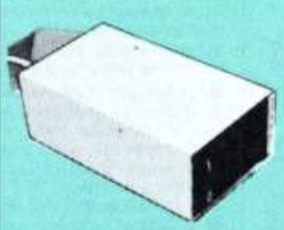

## 3½" DISC DRIVE OFFER

These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- Single 400K Drive **£69**
- Twin 800K Drives **£126**

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## Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

**£5.95** (Book No VAT)

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## DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

**£4**

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## FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

**£6**

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## ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** - holds upto 50 5¼" discs **£6.00**
- **M85** – holds upto 95 5¼" discs **£8.00**
- **M25*** – holds upto 25 3½" Discs **£5.50**
- **M50** – holds 50 3½" Discs **£7.50**

* Not lockable

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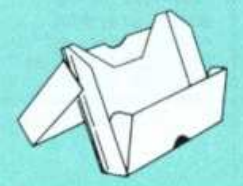

## PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

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## DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.
Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

---

## DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

## Quality Disc Drives from Watford

*To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.*

*The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".*

*The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.*

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes**. Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

*Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.*

*If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.*

*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!*

*When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).*
*P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.*

| Capacity | Drives without P.S.U. | | Drives with P.S.U. | |
|---|---|---|---|---|
| | Single | Twin | Single | Twin |
| 200K (360K) | CLS 200 £89 | | CS 200 £98 | |
| 400K (720K) | CLS400S £89 | CLD 400 £168 | CS 400S £99 | CD400 £188 |
| 800K (1.44M) | | CLD 800S £169 | | CD 800S £188 |

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
**Securicor carriage on Disc Drives £5 to £6**

***Prefix C** = Cased Drive*
*L = Less PSU*
*S = Single*
*D = Double*

*Suffix **S** = 40-80 Switchable*

*e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density), Double sided, 40/80 track switchable.*

**Cable to connect 5¼" Disc Drives to BBC Compact**
**Single £9 Twin £12**
**Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13**

## 3M – DISKETTES

*3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.*

- *10 × 5¼" S/S D/D 40 Track Diskettes (744)* **£8.00**
- *10 × 5¼" D/S D/D 40 Track Diskettes (745)* **£9.75**
- *10 × 5¼" S/S D/D 80 Track Diskettes (746)* **£12.50**
- *10 × 5¼" D/S D/D 80 Track Diskettes (747)* **£12.75**
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* **£28**
- *10 × 3½" S/S D/D 40/80 track Discs* **£13.50**
- *10 × 3½" D/S D/D 40/80 track Discs* **£15**
- *10 × 3½ High Density Diskettes* **£43**

### FREE

This extremely useful and attractive Personal Leather Organiser worth upto £50 is yours when you buy from us, 5 Boxes of any of the 3M range of Discs that we advertise above.

## TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box. We strongly recommend these Discs.

- *10 × **M3** 3½" D/S D/D 80 Track Discs* **£15**
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* **£6.50**
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* **£8**
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* **£9**
- *3" Double Sided Discs* **£3 each**

## Special BULK OFFER on 5¼" DISCS

PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

### BULK PACK DISCS in lots of 100

| Type | S-S 40T | D-S 40T | D-S 80T |
|---|---|---|---|
| ● Without Sleeves | £35 | £39 | £45 |
| ● With Sleeves | £38 | £42 | £48 |

PRICES SLASHED

## WATFORD's WINCHESTER DRIVES

- 10 Megabyte Unit with ADFS **£375**
- 30 Megabyte Unit with ADFS **£449**

(Supplied complete with utilities software)

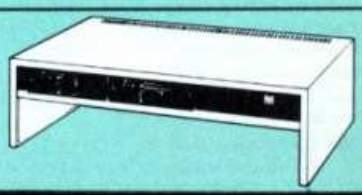
**CDP800S** **CDPM800S**

Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

**CDP 800S for BBC Micro £192** *(Securicor*
**CDPM 800S for Master £196** *Carr. £7)*

(The above drive units are 2 Megabytes unformatted)

## ACORN'S Twin 800K Disc Drives



Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.

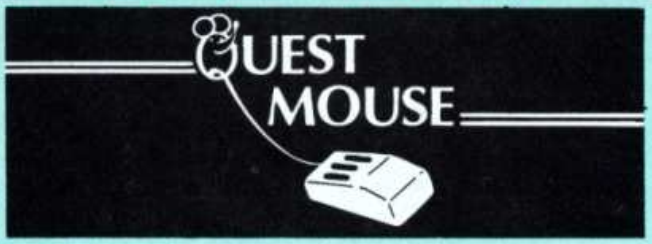
RRP £350

**Our Price: Only £175**
(carr £7)

**Continued →**

NOMINATED FOR MICRO BRITISH COMPUTING AWARDS 1987

# QUEST MOUSE



## QUEST MOUSE

*The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.*

*The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.*

## QUEST PAINT

*The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.*

*The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.*

## SOFTWARE FEATURES

*The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.*

*Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.*

*Take The Guesswork Out of Selecting a Mouse Package*

*With reviews like this how can you go wrong.*

***Popular Computing Weekly, 9-11 June '87***
*"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."*
*"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."*

***Micro User June '87***
*"Quest Mouse and Quest Paint can hold their heads high in the market. . ."*

***A&B Computing June '87***
*". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..."*
*". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."*
*"What we have here is probably the best art package there is for the BBC Micro . . ."*
*"Quest Paint is a major leap forward in BBC programming. . ."*
*"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".*

***Acorn User, September '87***
*"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."*
*". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".*
*"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".*
*"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".*
*"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".*
*"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".*
*"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."*
*"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".*
*"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program".*
*The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".*

***John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:***
*"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".*

***Lt. Cln. C.G. Holton, G2 HQ 1 (BR) Corps, BFPO 39, writes:***
*"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim".*

***Beeblet User Group, New Zealand Oct '87:***
*"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".*

*"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".*

*"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".*

# ConQuest

*Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.*
*Some of the features are:*

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

| | |
|---|---|
| ***QUEST MOUSE & QUEST PAINT*** | ***£59*** |
| ***QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT*** | ***£85*** |
| ***QUEST MOUSE ONLY*** | ***£29*** |
| ***QUEST PAINT SOFTWARE*** | ***£32*** |
| ***QUEST FONT DISC*** | ***£12*** |
| ***ConQuest 32K ROM Package*** | ***£29*** |
| ***QUEST MAT*** | ***£3*** |
| ***Part-exchange your old Mouse for a New QUEST MOUSE for only*** | ***£23*** |
| ***GXR ROM for BBC Micro*** | ***£22*** |

*N.B.*
*1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.*
*2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.*

## MARK II LIGHT PEN

*Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.*

***Price Only £21***
*(Price includes FREE software Disc and Operating Manual)*

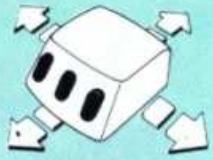
## RB2 Marconi Tracker Ball

| | |
|---|---|
| RB2 (AMX/Quest compatible) | **£59** |
| RB2 including Quest Paint | **£85** |

## FLEET STREET EDITOR

| | |
|---|---|
| Software pack for BBC Micro | **£33** |
| Software pack for the Master | **£39** |
| Software Pack for Compact | **£40** |
| Admin Xtra Disc Utility | **£13** |
| Walt Disney Disc Utility | **£13** |
| Fonts N Graphics Disc Utility | **£13** |

# THE NEW Mk III AMX MOUSE



**ONLY: £59** Inc. Super Art package
(carr £1.50)
*(Please specify for BBC, Master or Compact)*

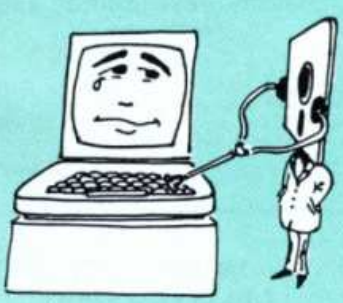
FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

| | |
|---|---|
| AMX MAT | £3 |
| AMX MOUSE ONLY | £29 |
| AMX DESK Package | £19 |
| AMX UTILITY Package | £11 |
| AMX SUPERART Package | £39 |
| AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse | £32 |

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

| | |
|---|---|
| PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker | £9.50 |
| AMX DESIGN (ROM) | £59 |
| AMX 3D ZICON Disc | £19 |
| AMX Database Disc | £19 |
| AMX XAM Educational | £15 |
| AMX EXTRA EXTRA | £19 |
| AMX MAX A gem of desktop (ROM) | £15 |

## DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

NEW

# The WAPPING EDITOR

Watford Electronics bring professional quality Desktop Publishing to the Beeb. The Wapping Editor is a totally self contained mouse-driven desktop publishing package designed to run on the BBC B, B+ and Master computers. The massive 64K ROM contains ALL the software you need to do your own publishing. It 'Brings the Freedom of Press' to your fingertip. The software has a word processor, a graphics package, a page layout section and a font designer. Although very sophisticated, Wapping Editor is simplicity itself to use. Anyone already familiar with Quest Paint will immediately feel at home.

## GRAPHICS PACKAGE

Imagine Quest Paint re-written to take advantage of the high resolution of Mode 0, well this is it. The Wapping Editor could well be worth buying for this section alone. This must surely be the ultimate in mouse-driven Mode 0 graphics.

## WORD PROCESSOR

This section is a fully functional word processor specially tailored to suit the Desktop Publishing environment. Gone are all the unnecessary and cumbersome text formatting commands – these are dealt with in the 'Page-Layout' section. The features of this word processor include wordwrap, wordcount, insert/overwrite, move block, copy block, delete block, search and replace, browse, etc, many of these features being mouse controlled. Text input can of course be taken from existing word processor files like Wordwise, View, etc, but it is not necessary to have a separate word processor in order to use this package.

## PAGE-LAYOUT SECTION

Page Layout becomes easy using these mouse-driven routines. The user simply 'pulls' a rectangle onto the page and states which text document or graphic is required to fill the space – it's as simple as that! Text can be automatically printed in a pre-set number of columns, left justified and/or right justified, or centered. Several different typefaces can be held in memory at one time. Graphics may be stretched, squashed or cropped to fit any size rectangle. Graphics input can be from the software provided in the package or, using the 'mode convert', from any graphics mode screen.

## THE FONT EDITOR

This is an enhanced version of the font editor contained in the Con-Quest ROM and allows the editing of ALL 95 characters. As well as being able to design your own typefaces, fonts from other DTP packages or from Quest Paint may be loaded into the editor and converted for use with the Wapping Editor. This sophisticated editor has numerous functions including slide, flip, invert and rotate individual characters or the whole font. Individual characters can be mirrored or copied and a mask feature allows you to superimpose two characters. Lines and columns can be inserted or deleted allowing the character to be stretched or squashed. This font editor will also allow 'font' and 'brush' files to be designed for use with Quest Paint.
This package is the latest in the line of integrated professional quality mouse-driven software from Watford Electronics, the company that adds Power to Beeb.

P.S. For details on Quest Paint and ConQuest, please refer to Page 7 of our advert.

# BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.
This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.
The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.
Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.
Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.
A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.
Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

**£109** (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

# Magazine Maker

(As seen on TV)
A combination of the Pagemaker and Watford's Beeb Video Digitiser.
Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.
They can then be used within Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.
With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.
Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.
Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.
Once created the picture can be printed out.
The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)

**Continued**

# ARIES CORNER

## The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

---

**CREDIT CARD 24 HOUR**
**Ansaphone Hot Lines**
**(0923) 50234 or 33383**

## Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price: Aries B-12 **£40**
Aries B-12C **£5**

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## ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

**£238** (Carr £3)

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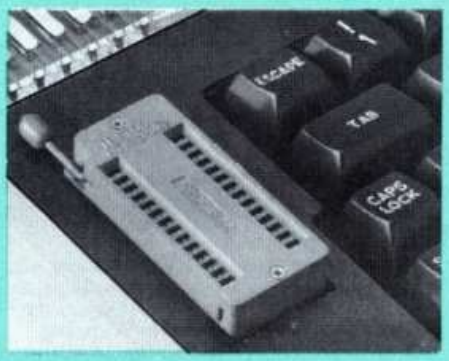
**All prices in this advert are exclusive of VAT.**

## SIDEWAYS ZIF SOCKET




Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

---

## Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

| | |
|---|---|
| ● Complete System | **£11** |
| ● Spare Cartridges | **£2.50** |
| ● Spare Rack | **£1.50** |

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**ROM Cartridges for the BBC Master**
Twin £7.50; Quad £12

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## 16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

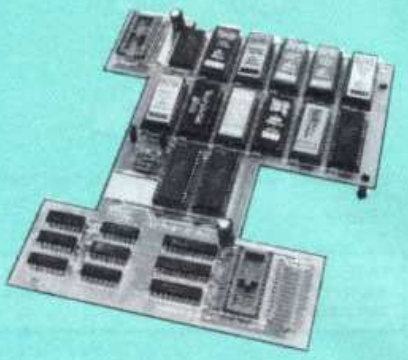
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£24** (carr £2)

### Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

**Price: Only £32**
Battery backup fitted **£36**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

**Only: £8**

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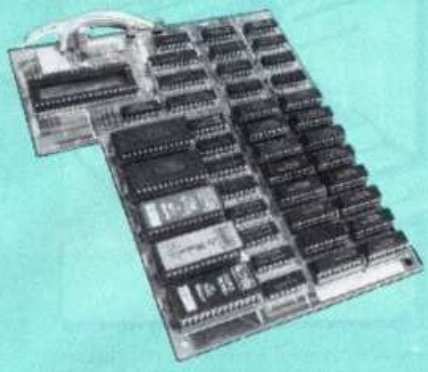
## USER PORT SPLITTER UNIT

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£21** (carr £2)

# ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

***INTRODUCTORY PRICES:***

- ROM/RAM card with 32k dynamic RAM ..... ***£39***
- ROM/RAM card with 64k dynamic RAM ..... ***£52***
- ROM/RAM card with a massive 128k dynamic RAM ..... **£80**

(carriage on ROM-RAM Card £3)

***OPTIONAL EXTRAS:***

- 16k plug-in Static RAM kit ..... **£6**
- 16k Dynamic RAM for Upgrade ..... **£7.50**
- Battery backup ..... **£3**
- Read and Write protect switches ..... **£2** each

Complete ROM-RAM board
All options installed ..... **£89**

**P.S.**
**Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less**

# Le Modem

## The MODEM from Watford

*At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.*

*The features that make Le MODEM such good value are:*

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

## SPECIAL OFFER

*Price:* ***£88***
*(carr £3)*

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

## Minerva Systems Software

| | |
|---|---|
| System Delta with Card Index | £55 |
| System Programmers Ref. Guide | £19 |
| System Gamma | £43 |
| System Gamma Prog. Ref. Guide | £19 |
| System Mailshot | £17 |
| System Reporter | £17 |
| System Intrer/View Link | £17 |
| System Sales Ledger | £39 |
| System Purchase Ledger | £39 |
| System Nominal Ledger | £48 |
| System Stock Management | £39 |
| Order Processing/Invoicing | £39 |

# APOLLO

## The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**
- **£6.50 off annual Membership to Micronet, Prestel and Telecom Gold.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£88** **(Carr £3)**
Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

## VOLTMACE JOYSTICKS

| | |
|---|---|
| Delta 3B Single Joystick | £12 |
| Delta 3B Twin Joysticks | £17 |
| Delta 3C Joystick for Compact | £10 |
| Delta 14B Single Joystick | £12 |
| Delta 14B/1 Adaptor Module | £12 |
| Transfer Software Disc-Tape | £7 |

## ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.
Only **£10** (£2 carr.)

## Versatile BEEB SPEECH SYNTHESISER Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

**SPECIAL PRICE £32** (carr £2)

**Continued**

## COMPUTER CONCEPT'S ROMS

| | |
|---|---|
| ACCELERATOR | £48 |
| CARETAKER Basic Utility | £25 |
| DISC DOCTOR | £28 |
| Graphics ROM | £29 |
| TERMI | £25 |
| COMMUNICATOR | £49 |
| SPEECH ROM | £24 |
| Printmaster | £28 |

**Wordwise** £24

**Wordwise plus** £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

**Word-Aid**

### The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

**HI-WORDWISE-PLUS DISC: £5**

**SPELL MASTER £42**

**Inter SHEET** ONLY £37

**INTER CHART** ONLY: £26

**Inter-WORD £38**

### MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £82

**INTERBASE £49**

All Prices Exclusive of VAT

## VIEW

| | |
|---|---|
| VIEW WORDPROCESSOR 2.1 | £35 |
| **VIEW 3.0 ROM** | **£48** |
| **VIEW PROFESSIONAL** | **£79** |
| **HI-VIEW** (for use with 6502 2nd Processor) | £36 |
| **VIEW Printer Driver Generator** (Please specify Disc or Cassette) | £9 |
| **VIEWSHEET (Acornsoft)** | £37 |
| **VIEWSTORE** | £39 |
| **VIEWSPELL with 80 track disc** | £29 |
| **VIEWPLOT Disc** (Please specify for Master 128 or Compact) | £22 |
| **VIEW-INDEX** | £12 |
| **OVERVIEW Packs 1 & 2 for the Master** | £72 |

### Watford's own Sophisticated VIEW PRINTER DRIVERS

| | |
|---|---|
| Epson FX80 & Kaga KP (Disc) | £8 |
| Juki & Brother HR15 (Disc) | £8 |
| Silver Reed Printers (Disc) | £8 |

### ADVANCE COMPUTER PRODUCTS' ROMs

| | |
|---|---|
| Adv. Disc Toolkit | £29 |
| Adv 1770 DFS for Mast/Compact | £29 |
| Adv 1770 DFS for BBC/BBC+ | £29 |
| Adv Disc Investigator | £24 |
| Adv. Control Panel | £29 |

### MINI OFFICE II

| | |
|---|---|
| DISC Version for BBC B & B+ | £14.50 |
| DISC Version for BBC Master | £17.50 |
| ROM Version | £47.00 |

(When ordering please specify for which Micro & 40 or 80 track Disc).

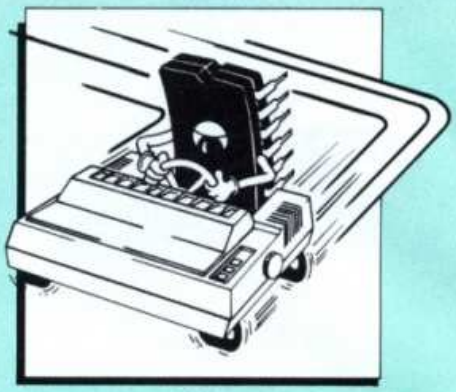
## REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

**£13** (40 or 80 track)

**Acorn's Speech Synthesiser package, complete**
**Special Offer £18**

## VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

**Price: Only £33**

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

*(Send an SAE for sample printout)*

**Only: £25**

VIEW PRINTER DRIVER for NLQ ROM £7

## DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

*The Micro User Feb. 1985.*
*'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".*

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

**Only: £25**

## BBC SOFTWARE'S
## Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£11.25**
- Maths with a Story 2 (Disc) 4 further maths programs **£11.25**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£17**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£20.00**
- BONDING: Science (Disc) O Level Chemistry program. **£20.00**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£20.00**
- ELECTRONICS IN ACTION (Disc) O Level program **£19.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£11.25**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£21.70**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£19.95**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20**
- Astronomy – Primary (Disc) **£12**
- Computers at Work – Primary **£17.35**
- Introducing Geography – Primary **£17**
- **Introducing Geography 11-17yrs** **£17.50**
- Electric Fields 6-14 years **£11.25**
- BlackQueen Contract Bridge **£13**
- Espana Viva – 3 Discs **£19.95**
- A Vous La France Disc **£21.50**

## THE NLQ DESIGNER

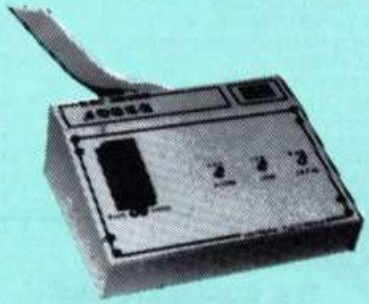
**(The First & still the Best)**
**Supplied with over 25 Different fonts**

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
Supplied with disc containing over 25 example fonts. (Please specify 40 or 80 track when ordering.) Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM, FONT Disc and Manual **£25**

**(Write in for further details on all above ROMS)**

## ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

**£75** (£3 Carr)

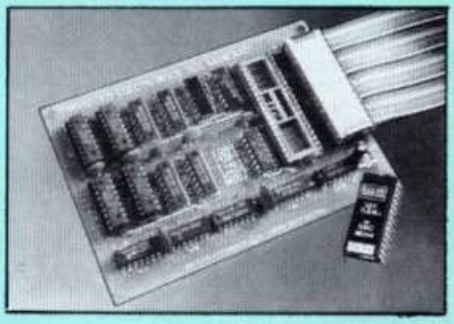
## TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

# *32K*

## SHADOW RAM-
## Printer Buffer
## Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.
- Recommended by Computer Concepts for use with their Inter series of ROMs.

**Only £59** (carr £2)
(Price includes a comprehensive manual and the ROM)

## INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

**Continued →**

## BOOKS (No VAT on Books)

| | |
|---|---|
| 15 Hr Wordprocessing BBC/View | £4.95 |
| 15 Hr Wordprocessing BBC/WW & WW+ | £4.95 |
| 30 Hour BASIC (BBC Micro) | £9.95 |
| 40 Best machine Code Routines | £7.95 |
| 50 Programs in BBC BASIC | £6.95 |
| 6502 Assembly Language Program | £19.95 |
| 6502 Application | £11.95 |
| 6502 Assembly Lang. Subroutines | £19.95 |
| 6502 Development Package | £7.50 |
| 6502 Reference Guide | £10.95 |
| 68000 Assembly Language Prog. | £19.95 |
| 68000 Machine Code Programming | £13.00 |
| 68000 Microprocessor Handbook | £14.95 |
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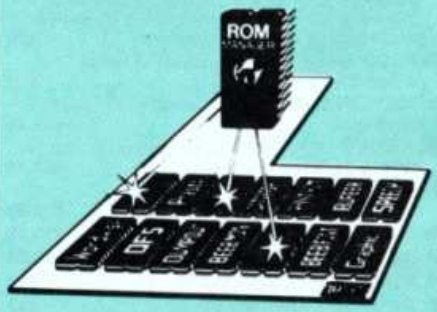


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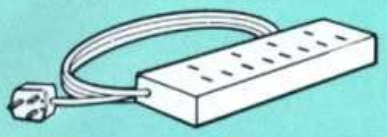

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**PCLINK** A package consisting of software diskette and RS232 serial cable, PCLINK allows the transfer and receipt of files between the Z88, and an IBM or compatible PC. As well as standard ASCII files, it converts Pipedream files into either Wordstar or Lotus files.

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**Z88-BBC LINK** connects the Z88 to the BBC Micro for file transfer purposes. Pipedream is compatible with View Professional.

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# ITV SOFTWARE

## Wordspinner (Time for a Story – Granada)

"The Wordspinner package is designed to add variety and interest to a wide range of basic reading activities and it can be incorporated into any reading scheme which encourages word building and/or word recognition."

The program simulates the mechanism of a fruit machine which contains letters instead of symbols. It has a facility to rotate, stop and adjust the position of all the drums in order to create words. The introduction states that the program is "extremely easy to use" and indeed it is, making good use of the menu system. The main menu offers five options: "Play", "Word Editor", "Options", "Concept Keyboard" and "Finish". The "Play" option can be used immediately as there is a built-in word bank comprising over 1500 words (2 – 5 letters long) and the only action required of the user is a touch on the <Space>. All the drums rotate then stop in a left to right sequence forming a word in the centre band. This encourages the youngsters to concentrate on the screen (and don't they just!) – and to anticipate/guess what's likely to be the next letter and consequently the word.

The program is set-up so that a word is guaranteed everytime the letters are rolled. However, one of the additional "Options" on the main menu alters the program so that non-words are introduced. In this mode the computer is programmed to produce words at frequent but random intervals. The other options offer sound, a nudge facility – function keys f1 – f5 move a barrel on one letter, while the number keys 1 – 5 hold the respective barrels.

This is fine as a game, but it's the Word Editor option which makes this program relevant to the work of individuals or small groups in educational terms. This enables files to be created, amended, saved and loaded. New files can be created by selecting words from the existing files or created from scratch. Using the former, this is achieved by setting the word length; asking for a sample – reducing the size of the word list by choosing words from it at random; selecting set letters; words beginning with, ending with or containing certain letters. These facilities – all available from the simple menu system – when combined with the Hold and Nudge options are of considerable value in phonic work.

The one option not available on my early pre-release version was the Concept Keyboard. This will be available as a separate support pack. Using this, the C.K. may be used in three different ways. The default option uses the Control overlay, which holds all the keyboard facilities for the running of Word Spinner. The Input overlay contains the keyboard and allows children to enter their own word lists, while the Matching option relates to matching between words produced on the screen and words or pictures presented on the C.K. overlay. Being a keen C.K. fan, I'm looking forward to this addition.

The "Utilities" option in the Word Editor menu enables the user to list files, set printer, merge files, convert text files – converting story files which may have been word processed into word files (in this option the file will be searched automatically for all words of five characters, or less, in length), and recover files which may appear to have been lost in editing.

The introduction in the handbook mentions the popularity of fruit machines for more than half-a-century and suggests that the idea could be invaluable in stimulating learning, particularly among children who find it difficult to learn or who do not want to learn. On a number of occasions I have quoted the story of meeting up with some ex-pupils around a dart board and being amazed at their ability to manipulate numbers – something they'd never shown in the classroom, so I can well imagine this program having a similar effect. Fortunately, perhaps, there's no "slot" at the bottom of the machine for a cascade of gold coins, so the gambling/competitive element is not encouraged – something which might worry some teachers in the light of recent publicity on fruit machines. If you're using a phonic approach then Word Spinner will catch the imagination of many a reluctant reader and will be a useful addition to your resources. Dare I say "I'm hooked!".

## Shape Up (Seeing and Doing – Thames)

*"Shape Up has been designed for six to eight year olds with the aim of encouraging them to recognise, match and then experiment with basic shapes, colour and text. It can be used to consolidate previous experience of shape and, given that children's understanding and development will be vared, can be adapted to suit a range of abilities."*

There are two progams on the disc, although the notes consider them as two sections of the same program – Match Up and Shape Up. The first uses logibloc shapes in a noughts and crosses type game for two players/groups. The first screen displays a series of shapes plus the words SAME and ANY. A specific shape can be selected for the match, a matching shape (SAME) or, if the colour is to be the important element, any shape. Then the choice of colour is offered and the procedure repeated for the second player. When the options have been selected, a three by three grid is displayed on the left of the screen and on the other side all the possible colour and shape options available are shown.

The players make their selection in turn – as instructed on the screen – by pressing the <Space> until the colour and shape required is highlighted and <Return> confirms the selection. This shape is then positioned on the grid in a similar manner. The ▶▶

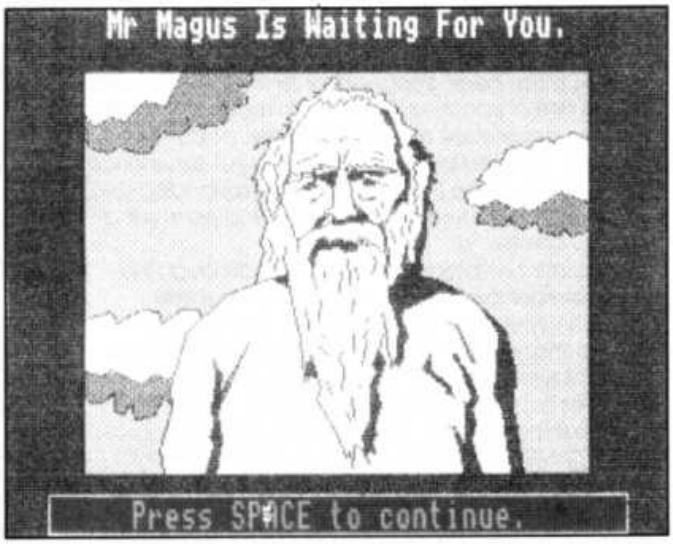
operation of the program is pleasingly simple and continues until one of the players has completed a line horizontally, vertically or diagonally, when the computer declares the winner – personally, if I had been Player One in the game illustrated, I'd have asked for a rematch! After this you are asked if you wish to play again and, if so, whether you wish to play the same game, ie use the same attributes, or change.

While some teachers will appreciate having this game on a computer, I suspect many will think that it could be achieved for a greater number in a shorter time by using a set of logiblocks and a piece of card. However, I suspect most children would opt for this version!

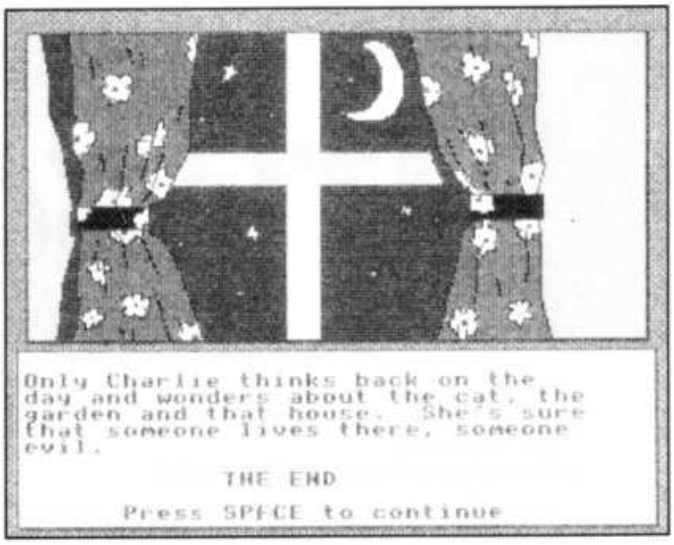
If you intend to select the "Shape Up" option from the main menu, you need to go to the Set Up Printer option the first time you use the program to configure the program to your printer, otherwise it will hang up if you try to printout your first masterpiece. You are warned about this, but not until the very last paragraph of the handbook!

The first screen gives the option of deciding whether or not you wish to add to the five basic shapes displayed at the top of the screen. I suppose the purist would say that a line is not a shape. Nevertheless, I would like to see it included. Assuming you wish to add to the shapes, one of the basic shapes is selected and this is copied onto the centre of the screen. This can be altered, ie made taller, shorter, fatter or thinner, and the program allows up to nine additional shapes to be created for use at any one time – unfortunately, this does mean that the shapes available to the "artist" have to be created before he/she moves into the designer part of the program, with no option of returning.

The "designer" option allows you to select any of the shapes created and make them bigger, smaller or rotate them (10 degree units), and these shapes can be added to the drawing, although there are some limitations near the margins of the drawing area. When the design is completed the colour option is selected




and this gives the opportunity to printout the design without any colour or to colour it. The latter is a pleasing option, with a wide range of colours/tones and several changes of palette available using the new colours option. I was disappointed to find that it wasn't possible to wipe an area if a poor choice had been made. A


Only Charlie thinks back on the day and wonders about the cat, the garden and that house. She's sure that someone lives there, someone evil.
THE END
Press SPACE to continue

simple text editor allows four lines of text to be added under the picture and again a printout made or the picture saved on a separate disc of picture files for later display.

A number of programs of this type have been available for some time. Although there are some variations between this and *Picture Craft* from BBC Soft, for example, it is doubtful if schools will be able to justify buying both. Personally, I prefer Peter Smith's excellent program, which makes use of the function keys and allows any of the shapes available – you can create your own set of basic shapes – to be adapted at the design stage.

## Mr Magus is Waiting for You (Middle English – Thames)

If you've ever tried to produce branching stories with a group of youngsters, you'll know they can be great fun, generate excellent discussion and you can end up with some interesting creative writing. For any who may not have heard of them, hopefully, all will soon be revealed.

Mr Magus is Waiting for You, a three part play by Gene Kemp in Thames's Middle English Series, is one of their specially commissioned dramas. This program links up with the plot of the play, but the software can be used with or without the TV episodes of the play (or the novel of the same title).

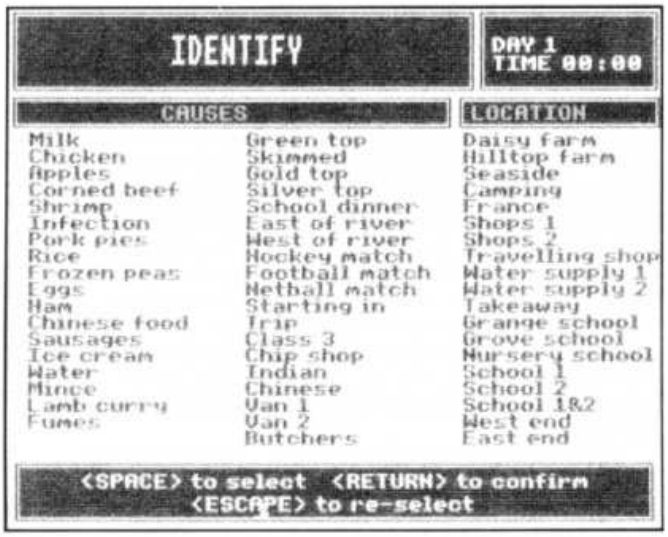
Before reaching the main menu, you have to register with a group name and password, which are required for further visits to the program, have a formatted disc available for story data, and configure the program to suit your printer. Unfortunately, the last mentioned has to be undertaken everytime the program is loaded, and it would have been useful for those fortunate enough to have a double disc drive if this option had been included for the data disc.

The main menu offers four options: *start a new story, Review the story to-date, Go to the last position,*and *See the instructions.* Taking the first option displays page one of the story together with a related picture. A touch on the <Space> bar scrolls the "page" at the end of which two or three choices of different routes to follow are offered, ie the branching story. At various points in the story opportunities are offered to enter your own dialogue for the characters or additional thoughts, memories. Some youngsters may find this difficult without seeing the next part of the story first, but

one of the options (good use of the function keys) available allows you to go back pages so, if this is a problem to start with, it can be overcome relatively easily. This is also a useful option if you wish to retrace your steps and continue with a different branch. Another option enables you to leave the predetermined program at any stage and finish on your own – the program allows a total of around 600 words to be added to the story (including any additional dialogue already added earlier) and provides a mini wordprocessor with automatic wrapround and facilities to delete and insert text. Of course, the word limit isn't a serious restriction, as any additional text can be added using a word processor – or a pen/pencil!

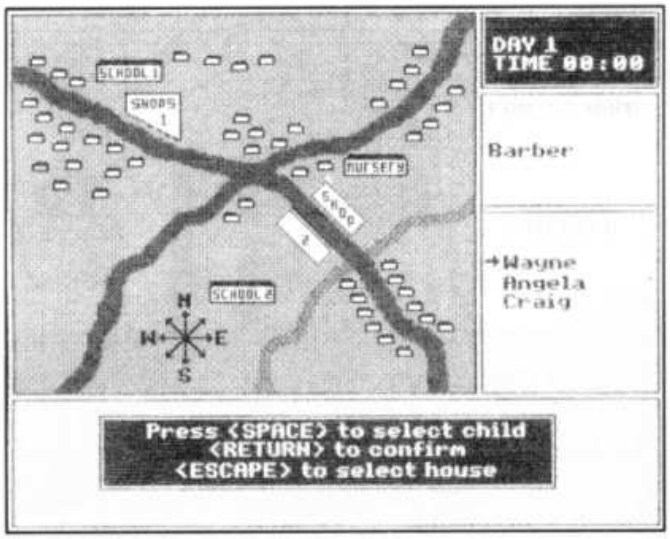
The story is illustrated by 30 coloured graphic screens. Some of these are quite effective – they might be more useful as discussion points if time were allowed for the completed picture to be displayed before any text – although the fill routines are rather tedious and some of the pictures did not reproduce particularly well in black and white in the printouts. The story can be saved at any point and reloaded to review the story to-date or return to the last position through the main menu. The inclusion of the graphics in the review procedure makes it somewhat of a long-winded process.

*Mr Magus Waits for You* provides an interesting introduction to the branching story concept – shame they didn't include an option which would allow users to develop their own stories! For those who would like to follow it up and try some for themselves there's Tracks in the MEP Language Pack as a starter, Class Reader 2: Yarns from CUP, or a teletext emulator such as Mikefax.




## Design a House

This package allows pupils to design and furnish houses, and plan the efficient use of living space. Pupils are encouraged to do their initial planning using paper, pencil, etc away from the computer and plans and furniture catalogues are provided so that this can be done. "There are, however, certain basic rules of design which ought to be considered when undertaking such a project and some of these have been built into the program so that when a plan is entered into the computer it is automatically assessed against these criteria and potential problems are pointed out to the user. As in real life, however, the user is free to accept or ignore most of the advice and the



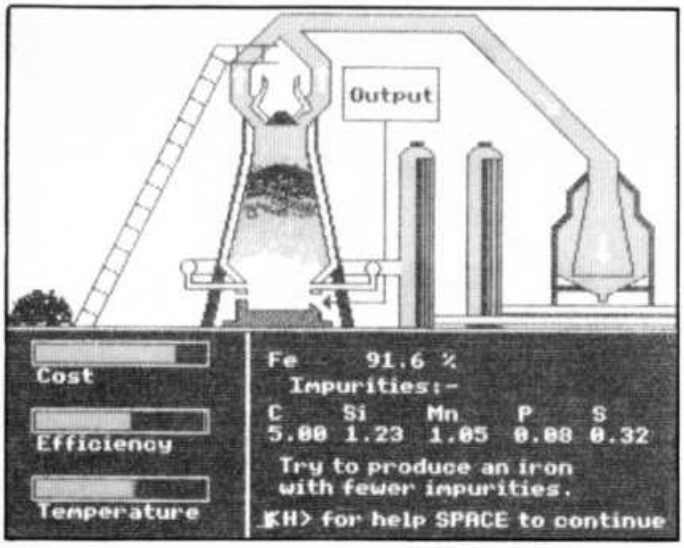

furnished plan remains an expression of the individual (or group) personality."

The first disc presents a set house plan, which the pupils can furnish within a given budget. The second includes an "easy-to-use" graphics package which allows pupils to create their own house plans and then furnish them. In both cases a "Design disc" has to be created and this will hold up to 30 files. This is the first option on the initial menu; the other enables users to continue with an existing file. When this option is selected, the user is given an update on money already spent on furnishing the house together with the amount remaining.

Both programs make good use of the function keys. In the first f0 (function key 0) gives a plan of the entire house, while f1 gives an enlargement of the area of the house around the cursor. This option is required to locate items of furniture. f3 offers a list of the major items of furniture – the arrow keys are used to select the items required, eg sink unit, settee, dining table. A touch on the <Space> and a range of the selected item with prices is displayed in three-dimensions at the bottom of the screen. The unit selected then appears in plan form at the bottom of the screen with a direction rose alongside, which helps with the orientation of the furniture. All this works well as long as you've remembered to position the cursor arrow correctly before starting this process. Make a mistake at any point in the proceedings and you still have to go through the process. As with the "Shape Up" program, I'd have preferred to have an on-screen fine tuning available – certainly, this would make it more user friendly for youngsters and ham-fisted reviewers!

The **free design** package (on disc two) is extremely easy to operate but would, to my mind have been much improved if the option of an on-screen scale/grid were available. Each group is allocated a budget (for both building and furnishing the house) and a map of the British Isles allows the groups to locate the area in which the house is to be built. Obviously, this influences the building cost, so in some areas the budget might be barely enough to build a doll's house (a slight exaggeration!). A useful option at this stage might have been to allow the group to decide on their own budget and see how close they get to it. Having selected the area, the computer displays the building costs per square metre for a house and bungalow and the maximum size possible for each based on the budget.

▶▶




External walls, windows and doors are drawn using a combination of the function and cursor keys and when this shape is completed the program calculates whether or not the overall design is within the budget. If not it can be modified – see what I mean about a scale being useful? Following this, electricity points and radiators can be put in position. As with the furnishing program, there are printout and save options.

Despite the few niggles where I felt the program could have been made more user-friendly, this pack will provide a new dimension to any project on Homes in the upper primary/middle school classes and could form the basis of an interesting CDT project in the secondary school.

## The Years of Change 1954-70 (How We Used to Live – Yorkshire)

This is the fourth set of software linked to the deservedly popular TV series for pupils in the 9 – 13 age range. Produced by IO Software, the company associated with Fernleaf Educational Software, it comes with a good pedigree – the earlier programs have been thought provoking, particularly for the older children in the age range.

Purchase a 40 track version then only three of the four programs available on the 80 track (or 3½") discs are included, but cost the same! True, the box contained a note saying that it could be exchanged for an 80 track if returned by a given date, but what if I didn't have an 80 track drive? Surely they've heard of flippy discs!

Assuming you have an 80 track version, the four programs are Transport, Home and Work, Shopping and Food, and Entertainment the last mentioned being the one not on the 40 track disc. For some reason, which wasn't obvious to me, the first topic has to be used by everyone, but after that a choice is available. There are some very interesting options available which fit in well with the development of skills and concepts. Users can select any of the three years chosen for the program, the first or last two years, or all three. If the last two are selected, then the decisions made will affect what happens later on. The three methods of operation enable groups to see information on an Issue for a particular year immediately before dealing with the Issue, see all the information about a Topic before dealing with any of the Issues in a particular year or, at the highest level, see all the information about all the Topics before any of the Issue pages.

As with the other programs in the series, the groups are expected to take on the roles of the people involved and in this pack are given the choice of being a roadman living in a council house or an electrician living in a Victorian house which he owns (or their better halves!). In the Transport program, for example, it looks at problems associated with both road and rail transport during the period: road safety, building of motorways, local bus services, car ownership, introduction of MOT, drinking and driving; the local branch line pre-Beeching, diesel trains, etc. Depending on the method of operation selected, the information pages are followed by a number of "Issues". The program offers several factors for consideration, and users are asked to add their own. The program then asks for them to decide on the most important/relevant, place them in order of priority, or indicates how they relate to earlier answers.

I must admit I found this program disappointing. Although one of the aims set was "the fostering of notetaking as a means of organising information", I would have to question whether screen after screen of text offers good use of computer time – could this not be provided in booklet form? – and the Mode 7 graphics were, to say the least, uninspiring. While accepting that this program is intended for use alongside the TV programmes, the occasional use of a digitised picture from the series would have livened it up considerably – compare this with Tressell's latest programs which basically take a similar approach. As it stands, it offers little more than a programmed learning booklet from the 60's but, looking to the future, it's the sort of program that might well form the basis for a series of interactive videos. *How We Used to Live* would be ideal for this treatment.

## In brief

Scientific Eye Software (Yorkshire) offers three situations designed to extend pupils' (11 – 13 years) datahandling, problem solving and decision making skills. In Bughunt!! pupils take on the role of members of a team of Health Officers investigating outbreaks of illnesses in a village. For Top Gear they select the clothing to be used by their climber on an Alpine-style expedition, then deciding on what's to be worn daily as a result of the weather forecasts during the climb. Lastly, in Spot the Polluters they take on the role of members of a Pollution Control Team. Good use of maps and graphics make these excellent examples of computer use.

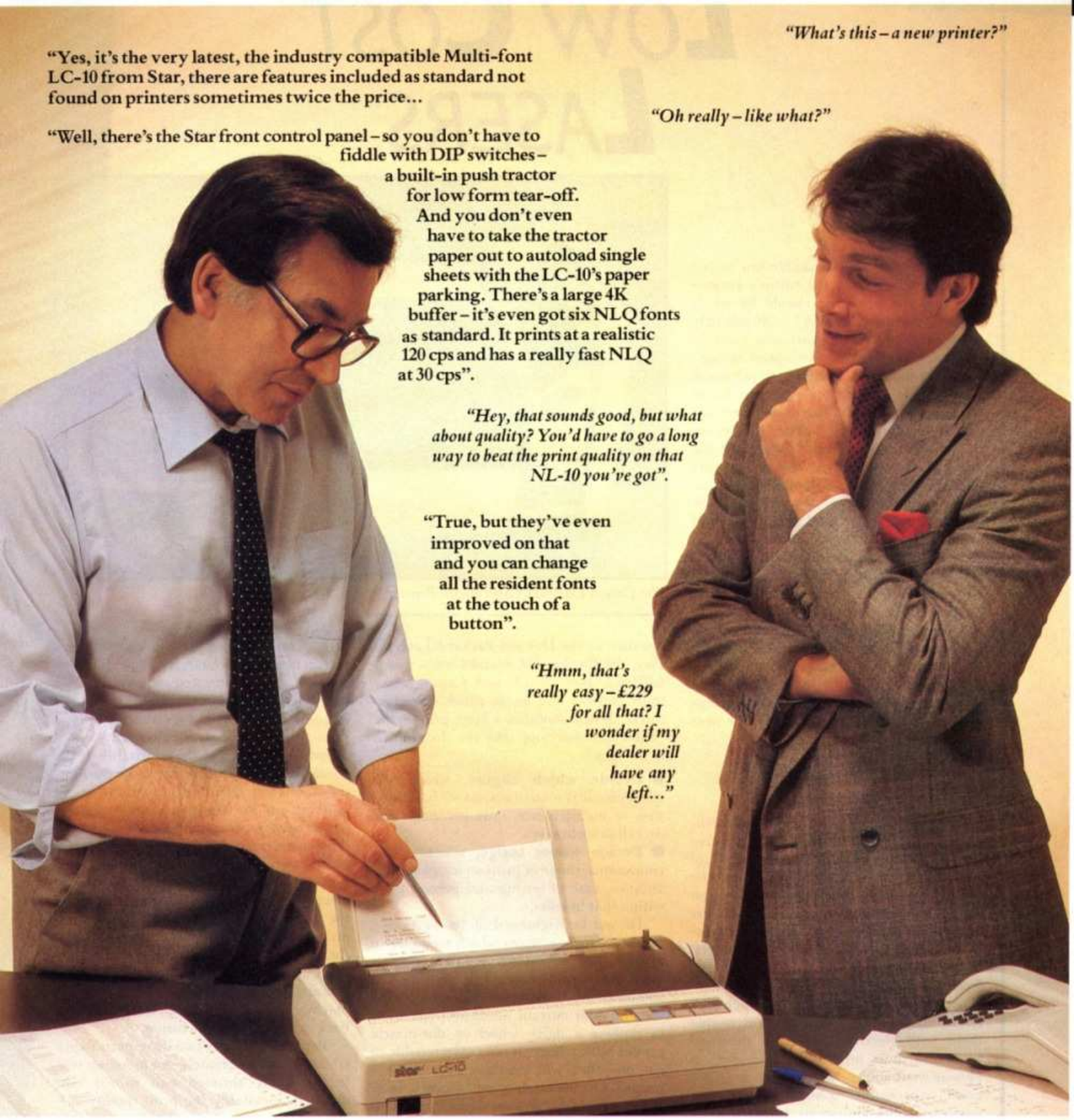
Iron and Steel (Chemistry in Action – Granada). This program has been designed to promote classroom discussion and allow pupils (GCSE level) to suggest various methods of extracting iron from iron ore. The computer indicates the feasibility of their suggestions, giving explanations and, where appropriate, chemical equations. Having very little knowledge of chemistry, I used this program as a self-tutorial pack. I found it very well-presented, informative and friendly.

Junior Maths 1 and 2 (Junior Maths – Central). These programs were reviewed in the Edsoft Special on ESM in October's Educational Supplement.

## Factfile

Unless otherwise stated, the software reviewed in this article is available to educational establishments through the normal channels for ITV materials. Others should contact ITV Association Ltd., 6 Paul Street, London EC2A 4JH. All prices quoted include VAT.

# "£229 for all that?"


"What's this – a new printer?"
"Yes, it's the very latest, the industry compatible Multi-font LC-10 from Star, there are features included as standard not found on printers sometimes twice the price...
"Oh really – like what?"
"Well, there's the Star front control panel – so you don't have to fiddle with DIP switches – a built-in push tractor for low form tear-off. And you don't even have to take the tractor paper out to autoload single sheets with the LC-10's paper parking. There's a large 4K buffer – it's even got six NLQ fonts as standard. It prints at a realistic 120 cps and has a really fast NLQ at 30 cps".
"Hey, that sounds good, but what about quality? You'd have to go a long way to beat the print quality on that NL-10 you've got".
"True, but they've even improved on that and you can change all the resident fonts at the touch of a button".
"Hmm, that's really easy – £229 for all that? I wonder if my dealer will have any left..."

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Star Micronics U.K. Ltd.,
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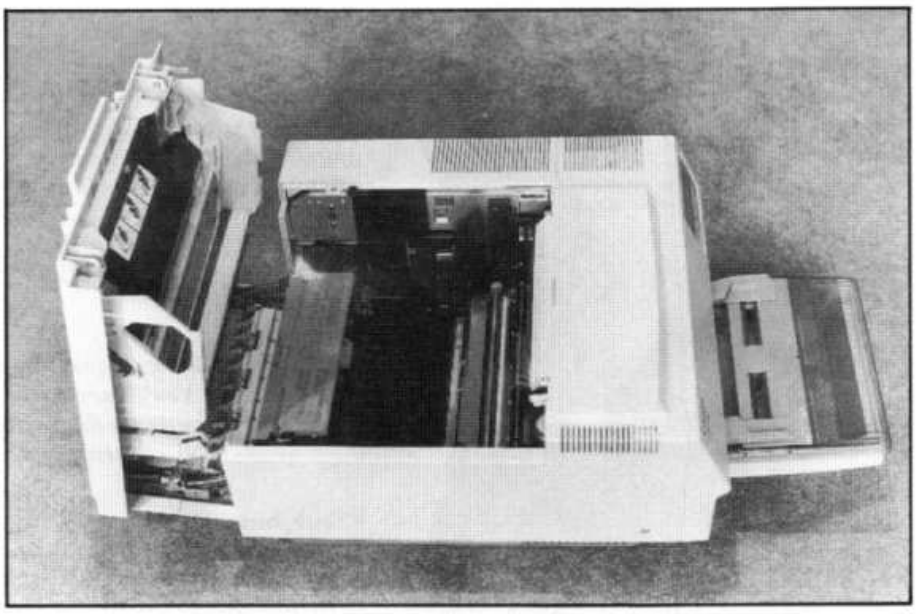
LC AB5

Jon Vogler



# LOW COST LASERS



The Canon LBP-8II Laser Beam Printer

I set out to test all available low-priced laser printers, taking the editor's suggestion that the price bar should be set at £2,200 (exclusive of VAT). Suprisingly there is quite a bit of variation even on machines with the same basic print engine.

I have therefore covered each printer in considerable detail, for the benefit of readers who, initially, like myself were not aware of the many subtle differences between various models. I have split the article into two halves: the first covers offerings from Canon, Olympia and Panasonic, and illustrates features of laser printer construction and operation, and some of the concepts which may be new, such as "badge-engineered print engines", emulations, vector graphics standards, etc. Next month I shall review offerings from Brother, OKI, Star and British Telecom. Also there will be a complete comparative table, listing over sixty different characteristics for each model, for quick comparison. So, if you can stand the suspense, instead of rushing out to spend your life's savings on a new laser printer wait until the next issue and get the whole story.

## Engines and Badge Engineering

Developing the electro-mechanical mechanism of a laser printer is an expensive business, way beyond the resources of most printer manufacturers. Designing the electronic logic to control such a device on the other hand is well within the budget and the competence of any company accustomed to designing computer printers. The result is a spate of new laser printers, from most of the well-known manufacturers, that use one of two "bought-in" electro-mechanical "engines" and couple them with electronic circuitry designed (and sometimes produced) "in-house", a personalised name badge and, in some cases, alternative control panels and paper-handling equipment.

## Down to Business

At the lowest end of the price range is an engine produced by Ricoh which is incorporated into the Olympia *Laserstar 6*, the British Telecom *MP2006*, the EPSON *GQ-3500* and the Oki *Laserline 6* not forgetting Ricoh's own *PC Laser 6000*. Slightly more expensive is a Canon engine installed in the Hewlett-Packard *LaserJet Plus*, the Brother *HL-8* and Canon's own *LBP-8II*. Both Ricoh and Canon make other engines and so do other manufacturers. When choosing a laser printer the reader can therefore take the decision in two stages:

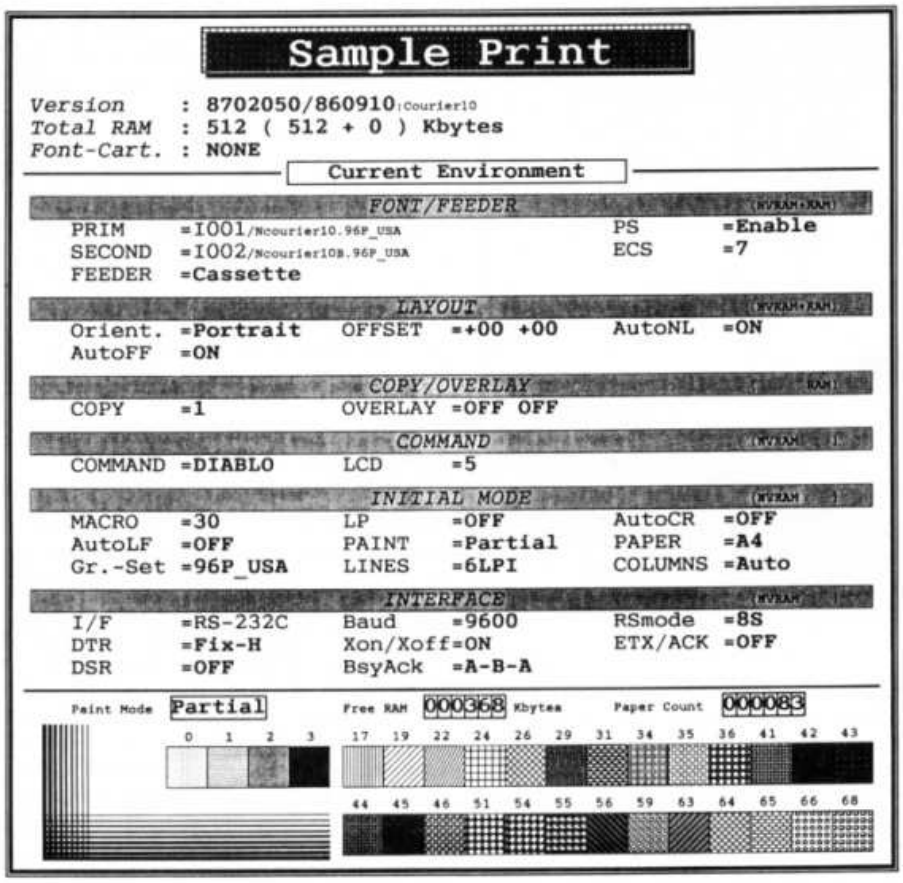
- **Decide which engine**, which will affect physical robustness, paper handling, ease of maintenance, cost per page and overall price bracket.
- **Decide whose badge**, which affects emulations, range of print styles, graphical abilities, ease of setting and precise price within that bracket.

Do not be frightened of "emulations". It simply means "from which well-known printer (not necessarily a laser) does it copy the control codes." If you have a computer or word-processor set-up that suits all your current needs and you want to replace a daisy wheel or dot-matrix printer with a laser, it may save trouble to get one that will emulate your current printer. On the other hand buying a laser with more ambitious emulations, particularly graphical abilities, may extend your current capability. Many laser printers will emulate several other printers, so you have quite a choice!

## THE CANON LBP-8II LASER BEAM PRINTER

The *LBP-8II* uses Canon's own engine (Fig 1), most famous for its use in the most recent model HP *LaserJet Plus*. It is, in general, well constructed on a substantial metal chassis although there are some fragile looking plastic lugs and some very skinny metal springs. Moving parts operate smoothly, such as the adjustable width envelope guides and the catch for opening the clam shell. The flush, membrane-type switches on the six-switch main control panel have a pleasant positive click and there is a sixteen character display but you cannot vary its brightness or contrast and it is very difficult to read unless the light is extremely good. The machine is quiet and the paper feed mechanism makes little more than a purr. There are two speeds on the cooling fan: for a short period after printing has taken place the fan runs extra fast and rather more noisily but, when the machine has cooled sufficiently, it dies back to a background whisper.

Paper handling is excellent: even paper which I had deliberately crumpled up was fed smoothly through and ironed out, although inevitably the print quality suffered. I did not suffer a single paper jam even though I was using second-hand scrap paper for much of the testing. It sits on substantial rubber feet and comes with both serial and parallel interfaces fitted, as well as having space for two font cartridges (although none were provided for my test). Toner and drum come in a single unit, replaceable after 4,000 copies at a cost of £95 which works out at just over two pence




Partial graphics from the Canon LBP-8II

per copy (excluding paper and power). The engine itself is rated at a minimum 300,000 copies although Canon estimate it will prove better than this in life-cycle tests. The standard machine comes with half a megabyte of memory and, for an extra £500 you can fit another megabyte, which will enable you to handle A4 bit-mapped graphics.

## Features

From such a pleasant and well constructed machine it is therefore rather disappointing to find that it has very unspectacular features. The basic machine comes with Diablo *630* emulation only, although if you are using an IBM *PC* you can get a "printility" disc, which will provide Hewlett Packard *LaserJet Plus* emulation. Likewise the range of built-in fonts is extremely modest: *Courier* (the fixed-pitch typewriter font), in Roman, Bold, Italic or a small-size foot note, available in portrait or landscape orientation and in nine languages plus two IBM character sets. The range of font cartridges, however, is very extensive: there are sixteen already available plus another ten in preparation and a specialist company will "blow" any other that you may require. Each cartridge costs £190.

The machine is certainly as fast as claimed: in fact it slightly exceeded its rated eight pages per minute and, more important, managed seven pages from a standing start.

## Control Panel

The control panel is highly effective but difficult to see under some lighting. As well as the display there are indicators to show: **Ready** which means it has power and has warmed up, **Alarm** which indicates that there will be an error message visible on the display **Data** which shows there is data in the machine awaiting print **On-Line** and **Form-Feed** which are self explanatory.

There are also four dual-purpose buttons which, in one mode: Continue printing after a stoppage caused by an error Print a test sheet or a list of fonts currently in the machine Reset the machine parameters and Enter menu mode. The second function of each is to move through the menu tree, either up or down to another level of menu or "sideways" through the various options on a given menu level. Setting menu items would be much easier if the handbook was more comprehensive and gave, for example, a menu "family tree". **Settings** cover the basic operations of: Selecting the interface, with baud rates ranging up to 19200 and choice of communication parameters, with **ETX** as an option in addition to **DTR** and **xon-xoff** . Saving current printer settings for resumption after switch-off Resetting to factory values Loading fonts from cartridges Switching "Daisy Wheel" which means, essentially, using a different national character set Switching between landscape and portrait orientation (paper upright or lengthways). Selecting **boldface**; if no bold font is present there is an internal macro that you can use instead and Setting page margins. Setting the number of print copies. This, which should be a straightforward task as it is frequently done, requires quite an elaborate journey around the menu tree and involves a total of some dozen switch pushes in all; most unergonomic!

## Macros

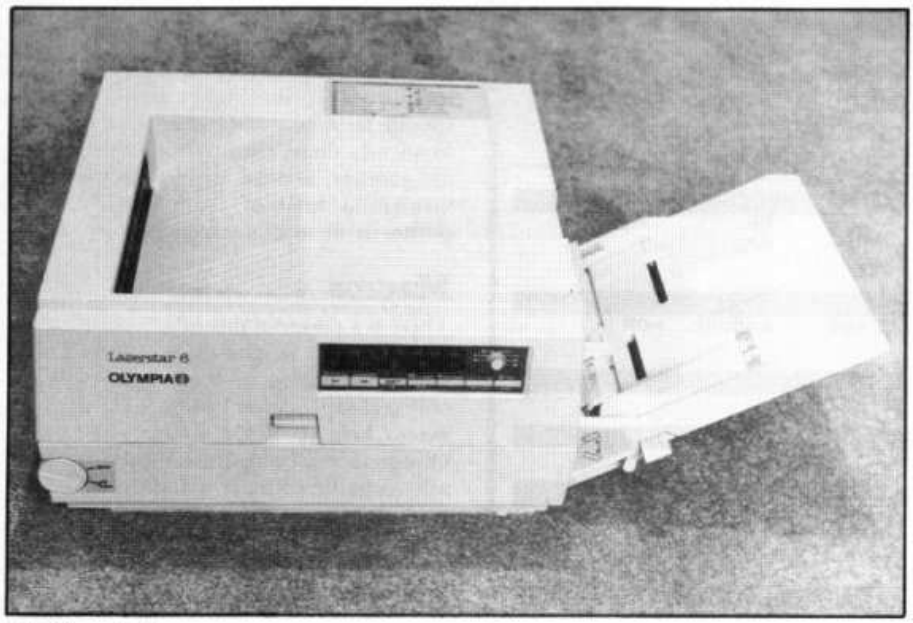
There is a powerful macro printing facility which, again, is spoiled by lack of adequate description in the handbook. The only real explanation I could find was for a macro held in ROM which prints four built-in forms. Using the control panel you select numbered macros and the machine prints a form for fax messages, a standard lined paper sheet, four rather elegant telephone message slips on a single A4 sheet and so on. This latter gave a good demonstration of the LBP8II's partial graphics (Fig 2): straight lines only, plus raster shading and some expanded print sizes, but all set within a neat double-line border. However it is obvious that you can also devise your own macros, for speed and economy of printing, and to create standard document formats into which you can merge your varying texts. However, without help from the book, how to define these and invoke them remains a mystery!

## Assessment

I felt that this was a good printer and I was not tapping into its full power due to its poor documentation. It is well built and will stand up to all reasonable office conditions. Operating costs are low but, if you want more than the most basic range of fonts you will actually pay nearer £3000 than £2000 for the machine with extra font cartridges and extra memory.

# OLYMPIA LASERSTAR 6

This machine uses the Ricoh print engine (Fig 3). The control panel is standard Ricoh but Olympia have designed and installed their own main controller board to great effect. However the old proverb about making a silk purse out of a sow's ear comes to mind because the parts supplied by Ricoh leave much to be desired, both in manufacture and in design. First, to be fair, the engine has some good points, in particular:Both serial and parallel interface are built-in. There is a choice of face-up or face-down, in number sequence, presentation of the printed copy (although for the former you would need to buy an optional face-up paper tray). Manual paper feed is provided, for envelopes, overhead transparencies, sheets of labels (but buy those specially designed for laser printers: they have a different adhesive which can tolerate the temperature inside and not end up

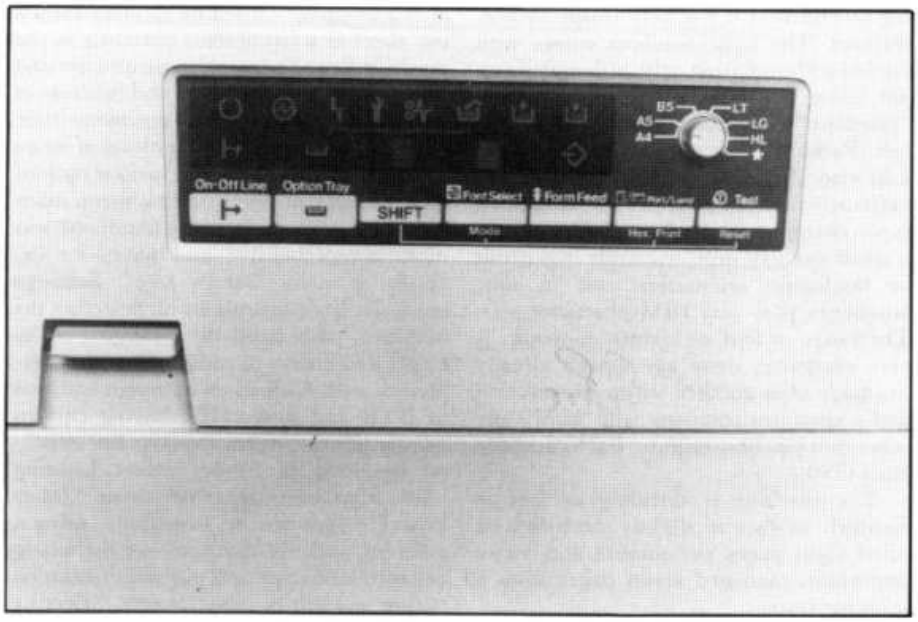



The Olympia Laserstar

with sticky paper all over your drum) or sheets of non-standard thickness paper.

● Toner replenishment comes in a separate unit from the replacement drum and costs £19.50 (for only 1,500 pages). The replacement collector unit costs £80 (for 10,000 pages) and collector unit plus drum costs £163 (for 20,000 pages) which sets operating cost at two and a half pence per copy in addition to costs of paper and power. The machine is small in size and modest in weight. Unfortunately the bad points outweigh the good. Obviously I did not dismantle the Ricoh mechanism but, from a superficial visual examination and a few hours of operation I noticed that: There is no basic metal frame: the plastic clam-shell box, with occasional metal reinforcement, comprises the basic structure. Many plastic components are thin and badly designed; some with thin, breakable stalks, sharp internal radii (if you want to know why they are undesirable, ask any engineer or read the account of the crashes of the De Haviland Comet, the world's first jet airliner, nearly forty years ago. Do people never learn!) The moulding is so poor and thin that the external top surface of the machine is actually rippled where there are corresponding ribs on the internal surface: the ultimate sign of incompetence in plastics moulding! The paper feed hopper is also particularly bad in this respect: it has the flimsiest of plastic catches on the front: just at the end which inserts, not at all smoothly, into the machine, so is doomed to damage in a congested, busy office.

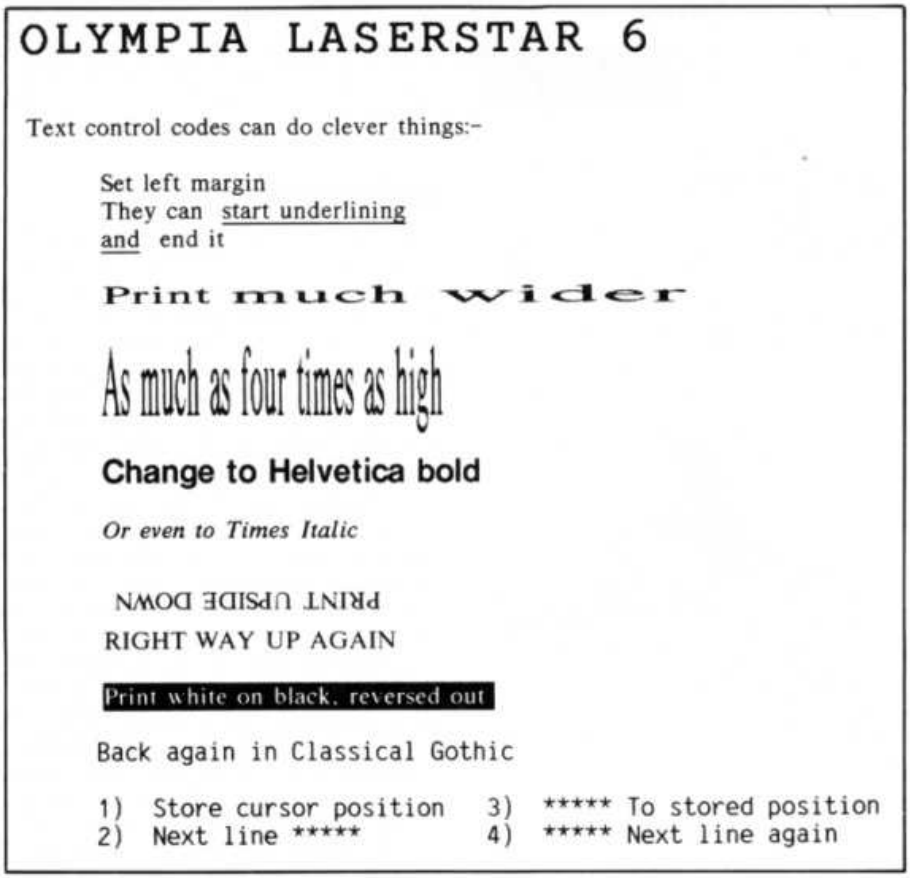
● Metal parts are very thin and flimsy: for example the spring which holds the flap that alters the paper path (from face-up to overhead and face down) is about as thick as a sheet of photo-copy paper and held in with one single self-tapping screw, so that the flap control-knob has a cheap, flimsy feel. The paper hopper (Fig 4) has various adjustments: paper width, envelope width and lever position for load or print, and all of these are stiff and awkward instead of being smooth and pleasant to adjust. The control panel uses cream, brown and black colours which are impossible to read (Fig 5), when an option is not selected and illuminated, unless in an extremely good light which, being vertical, it is unlikely to get. The switches themselves are of the flush membrane type with a sloppy feel: only the slightest positive click. The toner cartridge does not seal completely, down its right hand edge and even after a mere two or three hours' printing, on a machine that barely moved its position, there was toner lying loose. The consequences of transporting the machine with the cartridge still installed are absolutely disastrous; be warned. You end up with toner everywhere, inside and out! Compared with other laser printers the machine was quite noisy: especially the paper feed motor. For several dozen copies this produced an intermittent, squeaky whine, although this later disappeared. The paper handling system is intolerant of any slight irregularities in the paper being fed. This is fine if you print only single-sided, on brand new paper, but try printing double-sided, after paper from the first pass has lain on your desk a while, and you may experience problems.




Control panel on the Olympia Laserstar difficult to read symbols when not illuminated.

## Excellent Electronics from Olympia

So much for the sow's ear: now hear how Olympia, a German company of enormous experience in office equipment, have transformed it. First of all, in contrast to many other machines which use the Ricoh engine, and offer no more than 640K of memory as standard, they provide one-and-a-half megabytes of memory as standard, expandable to 2 megabytes, yet still keep the price of the machine under £2000 (excluding VAT), and exploited this abundance of memory by several delightful devices: Eight separate resident fonts, offering five different point sizes, three different pitches as well as proportional spacing and six different faces, including *Helvetica*, *Times* and *Times-Italic*. Any of these can be expanded by up to four times in height or width (Fig 6), so that effectively you have **eighty different type sizes** to choose from! If this is not sufficient, then a range of optional font cards will be available, although I was not able to test them. These have two clever features: first of all they are cards, not cartridges. They are precisely the size of a credit card, have no vulnerable surface components (they are all embedded in the plastic) and will cost £125 each. The great thing about them is that, whereas with


OLYMPIA LASERSTAR 6
Text control codes can do clever things:-
Set left margin
They can start underlining
and end it
Print much wider
As much as four times as high
Change to Helvetica bold
Or even to Times Italic
PRINT UPSIDE DOWN
RIGHT WAY UP AGAIN
Print white on black, reversed out
Back again in Classical Gothic
1) Store cursor position
2) Next line *****
3) ***** To stored position
4) ***** Next line again

Print versatility on the Olympia Laserstar

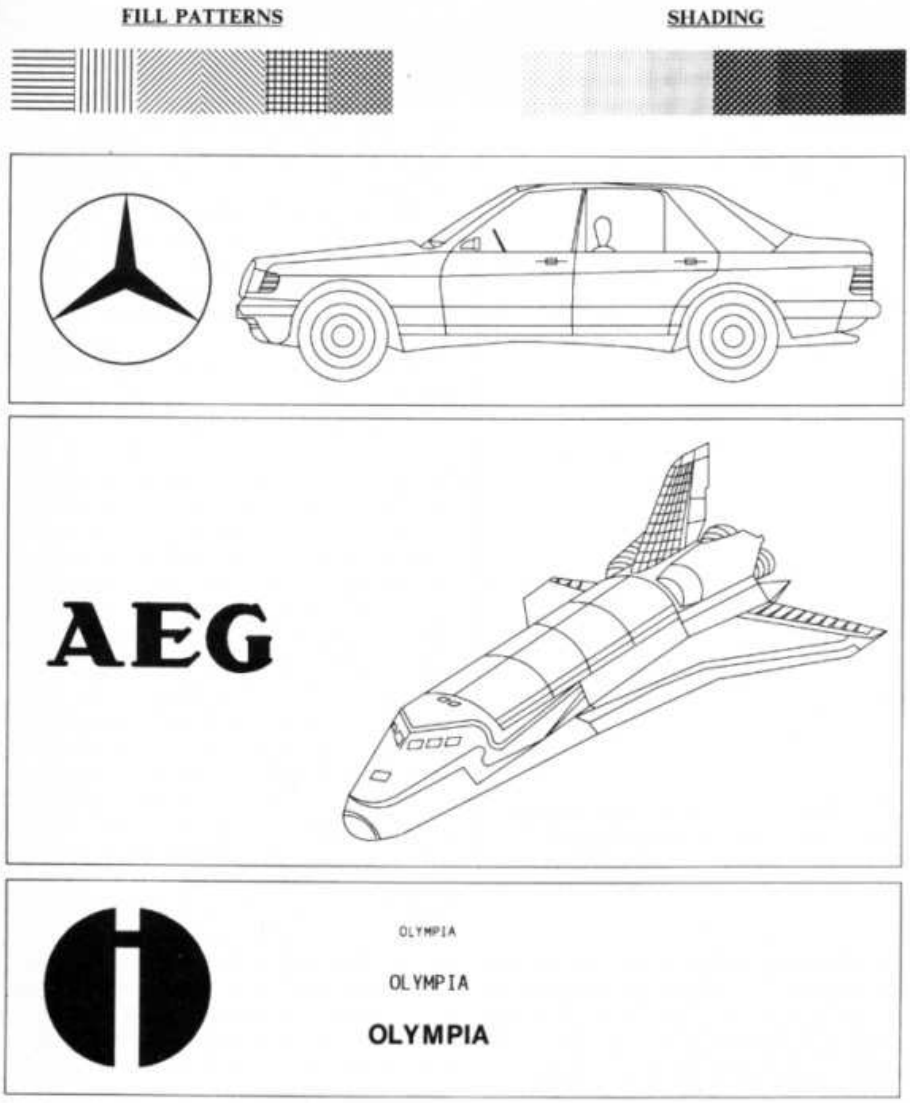
most printers you can use a single, or at most two, font cartridges at a time, with the *LaserStar 6* the contents of the card is automatically down-loaded into memory as soon as the printer goes off-line. You can then remove the card and insert another and the same happens and so on, progressively, until that huge memory is full. You now have a machine with a large number of alternative, resident fonts. Olympia offer a "style card" service: a card (Fig 7) which you can have custom-designed for your own business and which you insert in just the same way as a font card. The obvious example is for your own letterhead or invoice format and the particular feature is that you can merge text with this style card, so the whole process of standard stationery is revolutionised. Instead of maintaining stocks of six or seven different items of expensively pre-printed stationery, which need to be re-ordered well in advance, and the correct one loaded into the printer magazine depending on what document is to be produced, you now carry stock only of blank copy paper, insert the appropriate card at print time and merge your text with the pre-defined style. That at least is the theory; in practise there may be limitations such as: At present the only colour of printing is black; if you want colours you will have to go back to your jobbing printer. The price of style cards has not been announced but will probably be well over a £100 each. Olympia's Sales Manager was not able to leave me a style card to test, because the only one he had was needed for a demonstration next day but, in a hurried visit, he himself was unable to merge text and style. An embarrassing, temporary hitch no doubt (he explained that demonstration cards are not "written" to be merged, normal style cards are) but, if you are attracted by this feature, I have not seen it succeed myself and you should make sure the dealer demonstrates it before you buy. You can, of course, hold fonts or paper styles on your computer and down-load them into memory in just the same way.

A pair of x/y co-ordinates for each end of the line. These are based on four-digit ASCII numerals, one per dot of printer resolution, so that one inch is represented by three hundred. The co-ordinate system is the normal one used in printing: **x** is positive across the page from left to right but **y** is positive down from the top of the page (the opposite to conventional co-ordinate geometry). The range of shapes is quite modest: filled areas, circles, lines, arcs, segments and bars. Line width can also be specified, as can mode (for broken lines) and colour, which uses a variety of raster combinations from solid black, through vertical, horizontal or oblique shading, orthagonal or oblique criss crossing, dot patterns and so on down to pure white. There is a means of defining whether overlapping shapes will be transparent or opaque to those below them. Finally there is a facility for defining bit-maps, permitting free-hand or similar variations from the strict geometric shapes. The potentialities of *GKS* in expert hands are illustrated by Olympia's demonstration style card, which produced the display shown in Fig 8, with line drawings of a Mercedes car and space shuttle, of some intricacy but without the shading that would be possible using *PostScript* or *Impress*. However the remarkable feature is that this display required only 9K of memory to produce a full A4 page and is accordingly printed almost instantaneously. To have done the same thing in *PostScript* would have required a full megabyte of memory and probably have taken several minutes PostScript computation (to say nothing of file transfer time) before being printed. When one is looking ahead to the time when the same laser printer mechanism will double up as a fax, great economy of handling graphic data becomes very important. For those not engaged in true publishing, but simply requiring office graphics to handle logos, graph and chart displays, commercial letterhead or the prettification of catalogues and price lists, then *GKS* vector graphics is not only adequate but, because it is economical, is actually preferable to a full page description language or bit-mapped graphics package. Vector graphics is particularly easy to combine with BASIC programs: for example the BASIC loop and step functions can be used to produce concentric arcs or circles, radiating lines, shading and so on. However it has the disadvantage that pure code combinations are not memorable, you have to work with the handbook permanently open, unlike the easy to remmember, English-like constucts of a page description language such as *PostScript*.

## Control Panel

Olympia extract the very maximum from the rather unergonomic Ricoh control panel (Fig 5), which offers only two characters of display although it is dotted with no less than eleven additional indicator lights, each with its own symbolic shape. With no more than half a dozen switch-presses you can select type-style, portrait or landscape paper orientation, interface, language set, printer emulation (but the machine offers only three: HP *Laser Jet Plus*, Olympia with *GKS* or Diablo with *GKS* and then a fourth if you buy a card). Configurations of control panel setting can be stored in memory so as to be recovered after switch off. Error messages are also handled through the control panel lights and display, so that if the paper jam indicator lights (a picture of crumpled paper emerging from between two rollers) it will be accompanied by a digit to indicate whether it is in the feed area or exit area. Likewise if the spanner, that indicates a service call problem, lights then an indicator will tell you whether it is the motor, timer or memory that is ailing, so the service engineer can bring the

►►




Stylecard output in GKS vector graphics

appropriate spare. The system works well, providing you have the handbook available. There are no less than thirty-two different language character sets so that, if you select the correct set, you have available all the accented letters, umlauts, currency symbols or fractions you require.

## Assessment

If you are a single user, or a small office with orderly, tidy people who do not upset things, drop books off high shelves, trip over cables or mix paper clips with the photo-copy paper, then you might get away with using this frail and badly-made machine. You are then lucky because you get considerable power and flexibility, coupled with convenience and ease of use at (for laser printers) fairly modest cost. If you use plenty of simple standard graphics you would benefit greatly from *GKS* and could save substantially on stationery and printing costs. In any other situation I do not recommend this machine; I do not believe it will stand up to the rough and tumble of office life.

# PANASONIC KX-P4450 LASER-PARTNER

Panasonic, like many Japanese companies, is not noted as an innovator but is expert at getting the best out of the current state-of-the-art. The KX-P4450 has little that is radical yet is superior in value for money and specification: better made, more features and easier to use, for a lower price than any laser-printer I have so far tested. Part of the improvement is in basic design and manufacture: the engine is made (and made well) by Panasonic themselves; part is in price performance: the number and quality of features that you get for your money. In brief the KX-P4450 is a solid, **eleven**-page-per-minute, two input cassette machine with page-number sequenced, face-down presentation, superb menu-driven panel-control, dual interfaces, low running costs with replacement of toner from a simple bottle, independently of the drum and with optional font cartridges, all for a price very close to £2000 for the 500K version. The final price is still to be announced. This article was written after testing the first model to reach this country but units are promised in time for a launch at the *Which Computer? Show* in January 1988 with volume supplies promised by April 1988.

## Performance

First of all the speed: it fairly rockets along, spewing out a page every six seconds, with that eerie silence that is the joy of non-impact printers. Of equal interest to the manufacturer's eleven pages-per-minute rating (which I confirm) is that, from a standing start, it did eight successive pages of an A4 text document in the first minute! Those who fume that laser printers are great for long documents but too slow-off-the-mark for office use, particularly multiple short letters and envelopes will recognise that this is of equal value to overall speed rating. The model I tested had one megabyte of random access memory which enables it to do a full page of bit-mapped graphics, at three hundred dots per inch, at a time. This, incidently is a figure you can calculate yourself: if a page is about eleven inches times eight inches and you use three hundred dots per inch (DPI) you come to 8 x 300 x 11 x 300 = about 8,000,000 bits or 1,000,000 bytes. The basic model has half a megabyte so either you can do half a page of high resolution graphics (300 dpi) or else, to achieve a full page, you have to reduce the resolution to 150 dots per inch. Memory on the main board can be expanded to a maximum of 1.5 megabytes. A *PostScript* add-on to the main board is promised in "about six month's time" but the promise embraces an undertaking that you will not have to throw away any of the current hardware. No plans have been announced for electronics to handle other page or document description languages. Emulations include HP *Laser-Jet Plus* but Panasonic blush at naming a rival so blatantly and call it the *Panasonic LP*! In addition there are emulations of the Diablo *630* , the Epson *FX286* and IBM *Pro-Printers 1 and 2*. Finally, the machine can reject all this schizophrenia and just be itself and use Panasonic's own control-code system, (known as the Panasonic *KX-P1092* emulation, although I cannot find any machine called by this name in Panasonic's current product list because it is being replaced by the *KX-P1083* which is, in any case, Epson and IBM compatible. For any of these emulations it can either use a parallel (Centronics) or an RS-232 serial interface, with a range of baud rates from 300 to 19200. The basic machine comes with *Courier* (the typewriter) fonts built in, at 10, 12, 15 and 16.66 characters per inch pitch, plus *Century* proportional spaced font (which looks very much like Times but with slightly less thickening of the vertical characters), so it serves all office needs but would not be suitable for publishing. However for would-be publishers optional font cartridges currently

Built like a battle tank; the Panasonic KX-P4450 Laser-Partner.

available include "Dutch 801" which is similar to Times Roman and "Swiss 721" which resembles Helvetica. No price has yet been announced for cartridges. Print format can be normal, emphasised (the equivalent of bold-face: done by printing twice, with a single-dot horizontal movement between the two passes), double (the same but with the dots displaced vertically) double-width, underline, super and subscript (done in Courier 20) and Italics. There is also an "overline" capability but this can only be achieved by software control, not through the control panel. The character sets are basically those defined by the emulations, with a full range of "special" characters, corresponding to ASCII values 128 to 255 (depending on which emulation you use, these range from the essential accented vowels for French and Spanish and various currency symbols, to Greek letters for scientists and classicists.)

Sadly there is only one character option controlled by the control panel: the slashed or not slashed zero. What a pity not to have offered an automatic pound sign conversion for those word processors which have not yet reached the twentieth century!

## Construction

It is built like a battle tank: weighs in at 32.5 Kg so the unpacking instructions come with a stern warning that two people should lift it! Notwithstanding, it is surprisingly compact: occupies an area of desk only 70 cm by 41 cm if you use A4 paper cassettes (slightly longer if you use the available legal stationary cassettes). This compactness is achieved by making the machine very high and by the, now common, trick of taking paper over the top at the end of the normal paper path and dropping it into a moulded hopper on the top of the machine. The desirable result is that printed sheets end face-down, with the second sheet the way you want it: behind, not in front of, the first. This ultimate segment of the paper path is provided by a hinged end door, which flaps down rather like the unloading doors of a cross channel car ferry: an open invitation to OEMs to fit automatic collators, although Panasonic themselves do not offer this option. The input cassettes are delectably deep: three centimetres to hold two hundred and fifty sheets of paper each and have a perspex cover to keep the paper clean. You can have plain paper in one and letterhead in another and switch between the two with a toggle on the control panel. However you have to be off-line to do so; you cannot use it as a handy way of printing a five-hundred-page document without stopping. One of my favourite features of this machine is that the drum (which is rated at twenty thousand pages) is completely separate from the developer unit which has a similar rating. Toner is added by the bottle and a complete bottle-full is worth five thousand pages. My guess is that many people will squeeze even more life by not changing the drum or developer unit until print quality actually starts to deteriorate. So the running costs for this machine are going to be substantially below those laser-printers where the toner and drum come in a single sealed cartridge which could only manage some three thousand pages. Panasonic are reluctant to commit themselves to the life of the machine until they have completed a thorough endurance test; confidentially, this is because the 500,000 page rated life looks set fair to double to one million in tests but this cannot be proclaimed until rigorous testing is completed. Unofficially Panasonic engineers are in no doubt that you can substantially exceed their stated five thousand pages per month duty cycle. There is an optional envelope cassette but, sadly, no provision for manually feeding envelopes, for example through a "by-pass" just above one or other magazine. This is a serious nuisance. For general office correspondence you need to use one cassette for front-page letterhead and the second for follow-on plain sheets. To print the envelope you will therefore need to change magazines; Bother! The magazine can only feed envelopes in landscape mode but the control panel print menus allow you to switch the orientation of print, so this is no drawback. Although the sheet metal chassis is extremely substantial the plastic shell is not of the same calibre: panels are thin and flexible and many lugs and handles are poorly designed, with sharp internal radii on corners. The front cover hinges down and is held by a wire at one end only. If you inadvertently lean your elbow on the other end, the panel will break or tear away from the wire: a pity in a machine which is, in other respects, so well-made and Panasonic tell me their engineers in Japan have noted the problem. In other respects the physical design is good: all touchable parts (levers, locks and knobs) are in bright green for easy identification so that opening the unit or removing the drum or developer cartridges is extremely easy; you do not need the handbook to explain it.

## Control Panel

The greatest glory of this machine is the sympathetic, sixteen-button control panel which sweetens the normally painful process of printer configuration. It comes with a variable contrast liquid crystal display (and variable means you can really read it, regardless of the light conditions) and six indicator lights. The printer powers up in on-line mode unless there is an error detected. If no form-feed command is sent at the end of a text, the final page of data will remain in the printer until the print button is pressed. You can you to add extra functions to the carriage return, line-feed or form-feed control codes, to match your word-processor (or other applications software) for example by adding a carriage return to the line-feed function. selects the appropriate font, either from the inbuilt set or from an optional cartridge. Interface conditions: parallel Centronics or, in serial mode, a menu choice of protocols (DTR plus or minus, X-on/X-off or ETX/ACK) (I don't know what they mean either, but hopefully the dealer from whom you buy it will, will ensure that it is cabled correctly and will tell you which protocol to use), a range of baud rates, parities, data length and numbers of stop-bits. selects the printer whose function you want imitate.

## Assessment

This machine represents excellent value for money. If some faults in design of plastic mouldings are corrected it should prove robust; it is very fast, very easy to use and has dual paper input trays. Its only significant flaw is the lack of a manual paper feed. If you do not need vector graphics or a page description language, or if you need one but are content to wait for more than six months, then I recommend this as an excellent buy.

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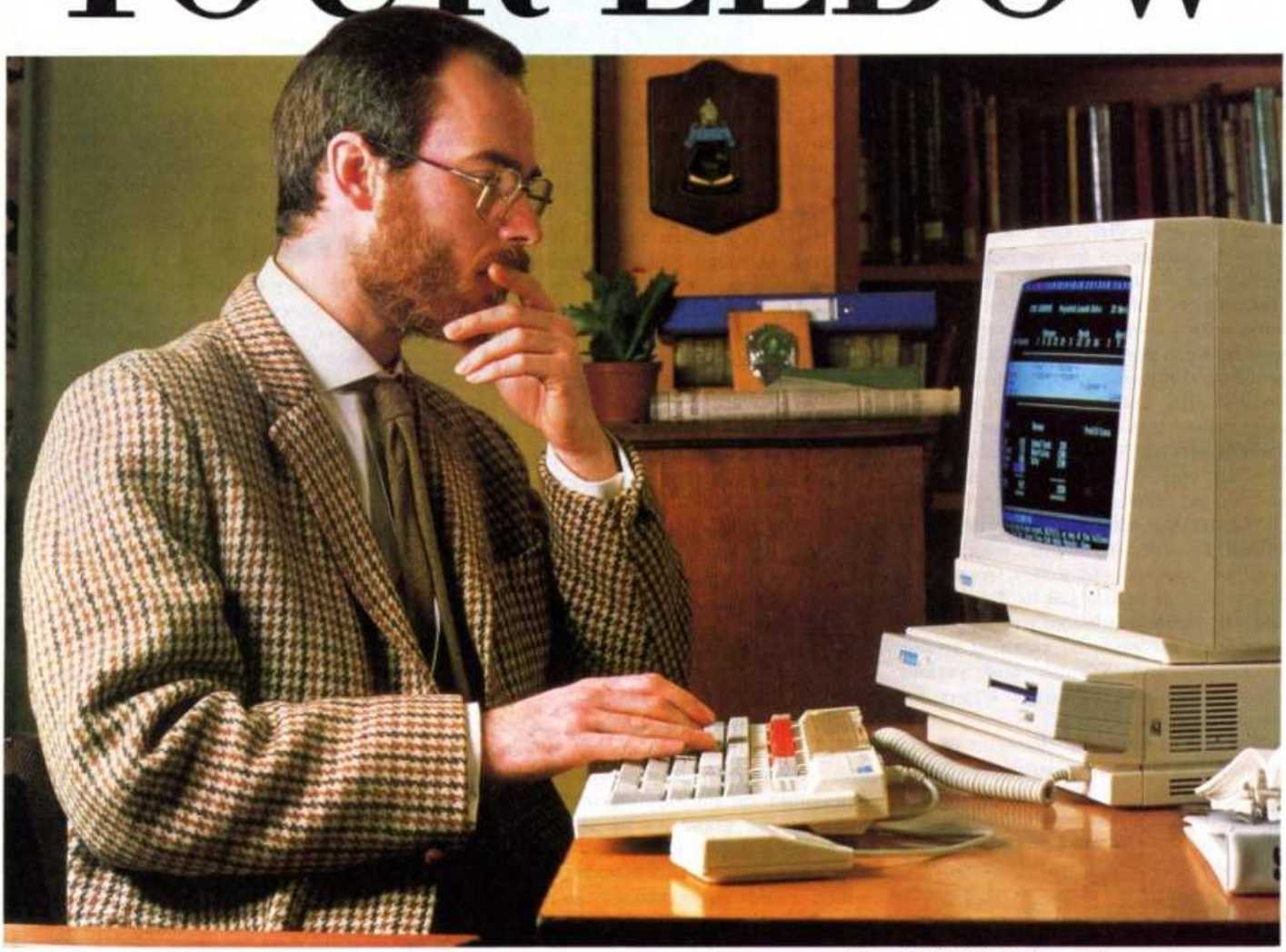

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# Archimedes COMPUTING

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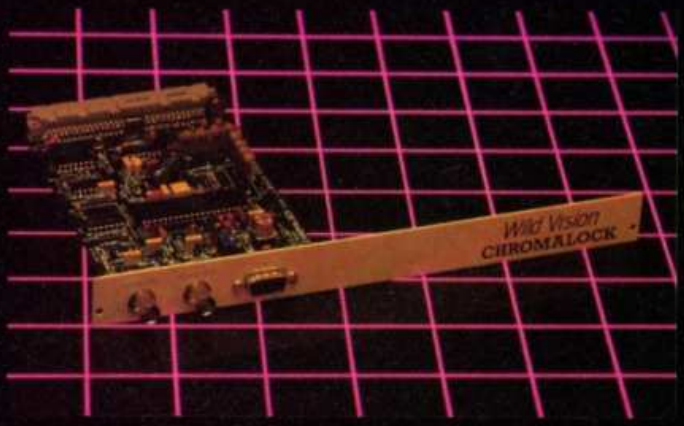



## Desktop video

**Wild Vision's taste of the future, the Chromalock genlock and video overlay system, has reached the A&B office. We are plugging in cameras and videos all over the place for a future review and the results are stunning.**

**You've heard of desktop publishing but what about desktop video? Marketing departments, training organisations and advertising agencies are all eager to use the new computer/video combinations available with computers like the Archimedes.**

**If you are interested in desktop video then have a chat with Triangle Television who have got the Archimedes plugged into video mixing desks. Triangle even offer courses in the techniques of video production for newcomers to this latest computer craze.**

## Archimedes Report

**GraphicWriter** proves itself a good first time wordprocessor and ported **First Word Plus** heralds a number of big league software conversions.

## Life

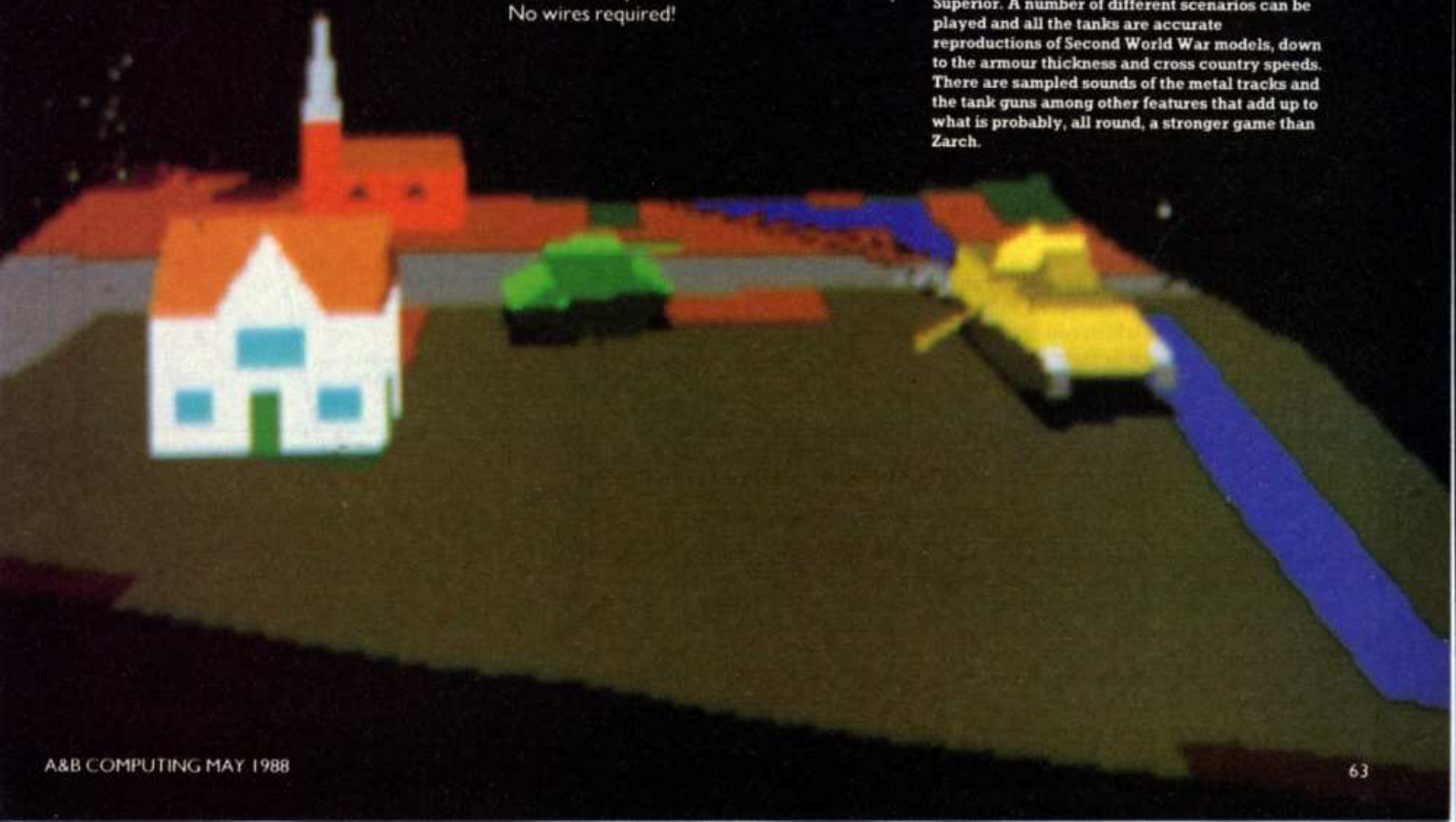
ARM assembler, mouse control – Life as it's never been seen before!

## DFS to ADFS

First things first: convert all that DFS software. Easy with this mouse driven utility. No wires required!

## Conqueror

**Conqueror is the latest Archimedes game from Superior. A number of different scenarios can be played and all the tanks are accurate reproductions of Second World War models, down to the armour thickness and cross country speeds. There are sampled sounds of the metal tracks and the tank guns among other features that add up to what is probably, all round, a stronger game than Zarch.**



Gordon Taylor



# ARCHIMEDES REPORT

## Processing words and pictures made easy on the Archimedes

*Here are two packages that handle both text and graphics – using the full 32-bit power of the Arc. Both can drive 9-pin dot-matrix printers and one also has drivers for daisy-wheel, 9-pin colour and 24-pin dot-matrix, and page (eg laser) printers.*

### Introduction

For this, my tenth report about the Arc, I am able to review two document processors that run in native 32-bit mode. This term describes applications that can process both text and graphics, while stopping short of a desktop publishing package.

They therefore go beyond the word processors that are currently available for the Arc, whether View, Wordwise, and Inter-Word, that use the standard font for display, and run under the 6502 Emulator, or ArcWriter, that uses the fancy, anti-aliased fonts on-screen, and runs in native mode – in that none of these can handle embedded graphics. Of course, there are a great many word processors, document processors, and desktop publishers available for the IBM-PC and compatibles, which could be run under the Arc PC Emulator. However, only some word processors respond acceptably fast under these conditions, while document processors and desktop publishers typically require a fast machine. Clares' Graphic Writer and Acornsoft First Word Plus are document processors which run on the Arc in native mode, which is faster than most PCs, and free from the 640 K RAM limit.

Like all other Arc word processors, both Graphic Writer and First Word Plus print text in character mode, rather than bit-image or graphics mode, which would be much slower. Printing text in graphics mode requires at least a fast 24-pin dot matrix machine, or a page (eg laser) printer – and these are still relatively expensive. Both document processors can output text (in a variety of styles) and graphics via 9-pin dot-matrix printers, while First Word Plus also has drivers for daisy-wheel printers (for text only), 9-pin colour and 24-pin dot-matrix, and page (eg laser) printers. I therefore tried both with two of the latest Epson printers – the EX-800, a fast 9-pin machine, and the LQ-500 – a low-priced 24-pin model.

| Fig. 1 | GRAPHIC WRITER | MENU MAP | |
|---|---|---|---|
| Word Processor | Word Processor | Information | |
| | Block Operations | Move Block | |
| | | Copy Block | |
| | | Delete Block | |
| | | Recall Block | |
| | Justification | Full | |
| | | Left | |
| | | Centre | |
| | | Right | |
| | Text Style | Plain or Bold, with Underlined, Italic, or both | |
| | Rulers | Place Ruler | |
| | | Set Margins | |
| | | Alter Position | |
| | | Delete Ruler | |
| | Block Markers | Set Marker | |
| | | Delete Marker | |
| | | Delete Markers | |
| | Force New Page | | |
| | Reveal Embeds | | |
| | Search and Replace | | |
| | Preview (no graphics) | | |
| | Multiple Documents | | |
| | Clear Document | | |
| (Common) | Disc Filing | Directories | |
| | | Text | Load, Save Text, ASCII |
| | | Graphic Objects | Save Graphics, VDU file |
| | | Sprites | |
| | | Master files | Load, Save Multi etc. |
| | | File (Drive) Menu | |
| | Goto Word Processor | | |
| | Page Format | Header, Footer, Page Length etc. | |
| | Goto Page Composition | | |
| | Draw Graphic Object | Colour Palette, Various Shapes, Line, Linked Line | |
| | | Fill | |
| | | Block Menu | Block Copy, Move, Delete |
| | | Status | Outline, Filled, Both |
| | | Scale Graphic | |
| | | Name Graphic | |
| | | Clear Graphic | |
| | Sprite List | | |
| | Mini Preview | Full Preview | |
| | | Colour Preview (Page Composition only) | |
| | | Print (text only in Word processor) | |
| | | Page Up/Down | |
| | | Page Number | |
| | | Exit Mini Preview | |
| | Print (text only in Word Processor) | | |
| | Exit Graphic Writer | | |
| Page Composition | Graphic List | | |
| | Layout Menu | Place Graphic | |
| | | Place Sprite | |
| | | Clear Graphics, Sprites | |
| | | Copy Layout | |
| | Graphic Attributes | Copy Graphic | |
| | | Delete Graphic | |
| | | Proportional | |
| | | Border | |
| | | Overwrite Graphic | |
| | | Re-Assign Graphic | |
| | Preview, Graphic, Mono | | |

**The Graphic Writer Menu map detailing the "flow" of the program and listing the many features of the various options. Note the Graphics facilities at the end of the list.**

### Clares' Graphic Writer

*Graphic Writer (GW) is the new name, after Apple objected to Image Writer. GW is menu-driven and uses the Arc windows and mouse interface. It will run on a 305, but this allows only one text document (of 32 K), with object graphics, but no sprite graphics, and at least 1 MB of RAM is*

Fig. 2 WORD PROCESSOR PERFORMANANCE

Times in seconds

| Package | Computer | Disc | Load | Save | Search | Scroll |
|---|---|---|---|---|---|---|
| Inter-Word | Master 128 | ADFS 640 K | 4.5 | 4.8 | 3.7 | 16.0 |
| Wordstar 3.3 | IBM-PC | DOS 360 K | 4.2 | 26.7 | 12.5 | 48.6 |
| Word 3.0 | IBM-PC | DOS 360 K | 5.7 | 30.0 | 18.2 | 90.1 |
| WordPerfect 4.1 | IBM-PC | DOS 360 K | 4.2 | 15.9 | 8.7 | 75.7 |
| Inter-Word | Arc 310 | ADFS 800 K | 3.4 | 4.4 | 8.4 | 13.4 |
| ArcWriter | Arc 310 | ADFS 800 K | 16.0 | 8.2 | 3.0 | 92.2 |
| Graphic Writer | Arc 310 | ADFS 800 K | 3.0 | 4.5 | 1.0 | 7.0 |
| First Word Plus | Arc 310 | ADFS 800 K | 5.2 | 6.5 | 3.0 | 50.5 |

Results for PC packages from Byte, Oct 1986, p 262

**Word processor performance chart comparing Interword, Arcwriter, Graphic Writer, First Word Plus and Wordstar. Massive differences become apparent with search and scroll benchmarks.**

*required to enjoy the full facilities. While loading, GW reads the Configuration status of your machine, and stores it, before re-configuring it to suit (either a 305 or 310). Your original configuration will be restored afterwards, however you exit GW (even by switching off).*

GW handles documents of up to 32 K as one file. This is little more than in many Model B/Master word processors, but is a consequence of fitting in the 305, and the provision of a text buffer of equal size. 32 K corresponds to some 4500 words, which should encompass a chapter, and may be as much as you want "at risk" in RAM at once. Larger documents are handled as multiple files of 32 K, under a "master" file, which lists them (much like Inter-Word and View Professional). There can be up to 14 text documents in a 310, and up to 16 in a 440 – this last corresponding to some 240 pages. Page numbering can be continuous, and adjusts automatically with pagination. Graphics appear within the document files, both on-screen (in some Preview modes), and when printed, but are handled separately – either as sprites, or as object-based graphics files – with only pointers in the text document.

GW is booted with Shift-Break, and comes up in the word processor (edit) mode (as in View Professional). A document file called "!Default" is loaded automatically, which includes the default page layout, with the page length, top and bottom margins, header and footer, line spacing, ruler and side margins, pad and pound characters, and cursor position. The maximum number of text lines is 70 – ie 11.67 inches (as "exact" A4). It also supports only "global" line spacing – ie the same for the whole document. The main menu is available via the Menu (middle) button on the mouse. (See Fig. 1). This brings up a series of icons, one of which allows the page layout to be changed. If desired, this may be saved as the new default.

## Editing Text

The GW word processor operates in two modes – edit, and preview (as in Wordwise). The former allows control codes to be inserted and deleted, while the latter allows their effects (eg normal, bold, italic, underline, subscript, superscript, etc) to be displayed on-screen. This is not What-You-See-Is-What-You-Get (WYSIWYG), since you cannot edit in preview mode. In fact, edit mode uses standard text characters, which handle quickly, in white on dark blue, while the previews use graphics, which is slower, but allows all the text styles to be shown, in black on white – along with any embedded graphics. GW scrolls very smoothly in both edit and preview modes, but the latter is limited to the current page (until you use Page Up or Down).

GW is limited to a maximum of 80 characters per line, so there is no provision for sideways scrolling. Although menu-driven, the GW word processor makes use of the function keys. For example, when entering text, GW defaults to Insert, but can be toggled to Overwrite, with the cursor changing between a square and an underline respectively. In both cases it flashes (except when on an embedded or control character, which can cause it to "get lost"). Text is entered at about the middle of the screen – as in Wordwise and Inter-Word. Also, Ctrl-A to delete right, Ctrl-S to change case, and Ctrl-L to delete line are all the same as in Wordwise and Inter-Word. (However, Delete Word has not been implemented, since it is judged too quick – and destructive – on the Arc).

Text may also be merged from another GW document (which has the filetype &400), or may be imported as an ASCII file (which must have the filetype set to &FFF).

Blocks may be marked by inserting markers 1 and 2, by clicking with the left Select button, prior to various operations, such as move, copy, and delete. These operations make use of a buffer (also of 32 K), so that the whole of one document can be Recalled, and it may also be used to transfer text between documents (in memory).

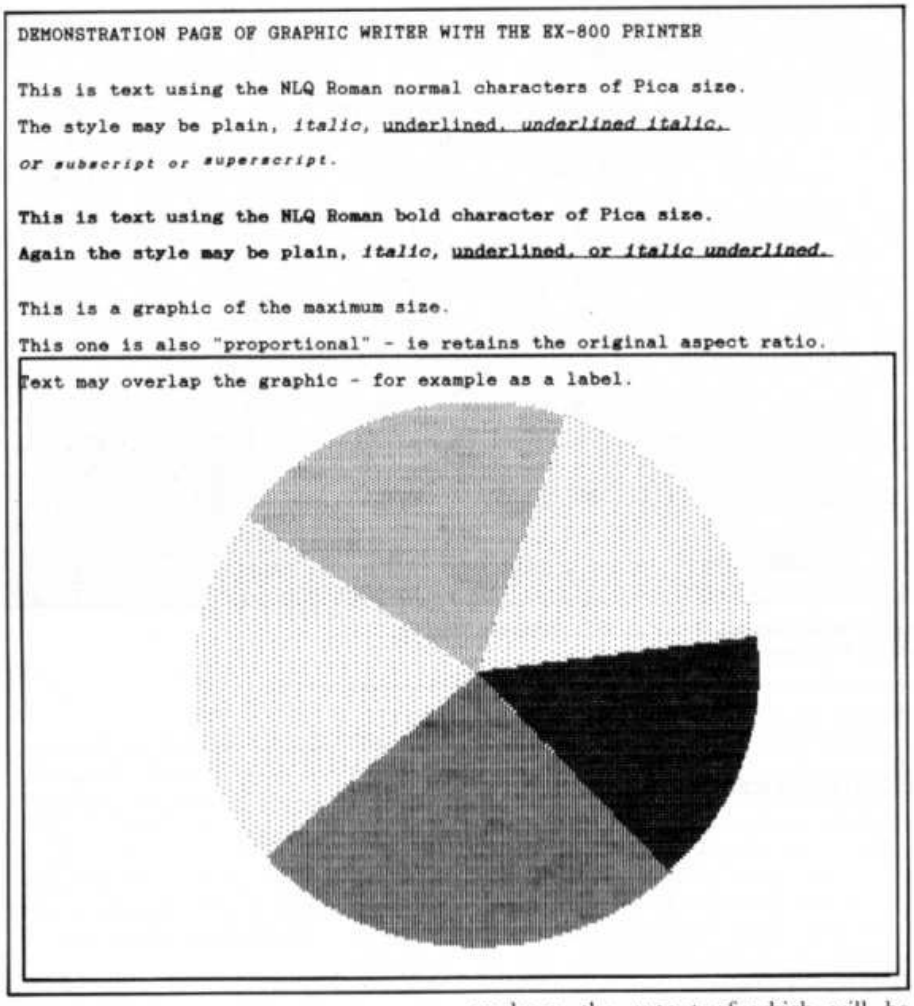
By clicking on the word processor icon when in the word processor, information on the current document is displayed in a window. This includes the bytes (characters) used, the bytes free (of the 32 K maximum), and the word count. It also shows information on the current block, including the size in bytes, and the word count.

## Performance

The cursor moves along the line very fast indeed, and also follows the logical sequence of text, both forward and back (as does Wordwise and Inter-Word, but not View). For the standard Byte document of 4000 words, divided into 40 paragraphs, formatted to 80-columns, (but not justified), the times for various operations are shown in Fig. 2. The time to scroll it from top to bottom in Edit mode – at 7.2 s – is very acceptable, and the scrolling in Preview mode seems little slower. GW is fast because (like Inter-Word on the Arc), it does not use a window for the main display, and hence can use "hardware scrolling".

## Editing Graphics

The graphics editor in GW is object-based, and hence the results are scalable. However, sprite graphics may be imported into GW documents, provided they are in a 16-colour graphics mode – 2, 9, or 12. They may be saved screens, or output ▶


DEMONSTRATION PAGE OF GRAPHIC WRITER WITH THE EX-800 PRINTER
This is text using the NLQ Roman normal characters of Pica size.
The style may be plain, italic, underlined, underlined italic,
or subscript or superscript.
This is text using the NLQ Roman bold character of Pica size.
Again the style may be plain, italic, underlined, or italic underlined.
This is a graphic of the maximum size.
This one is also "proportional" - ie retains the original aspect ratio.
Text may overlap the graphic - for example as a label.

**A sample dump from the EX-800 printer using Graphic Writer – Note, this is not built into the printer itself!**

from pixel-based programs, such as Welcome Paint, the Sprite Editor, or Clares' Artisan (see A&B Jan '88 p64). If you want to include sprites, you must configure the SpriteSize for yourself, since any RAM so reserved reduces that available for documents.

The range of drawing "primitives" in the GW graphics editor is rather limited, with lines, rectangles, circles, sectors, segments, and ellipses but no arcs. They are generally available in both outline and filled forms, save for sectors and segments, which the Operating System does not support as outlines. Although freehand drawing is not supported as such (due to the amount of data that would result), linked lines are allowed – which could be used in a similar fashion (but only as straight lines between "click-points"). Moreover, the work area is less than one screen, with no scrolling or zooming – though object graphics can be scaled in the editor, for previewing. There is no grid available, nor any display of XY co-ordinates, or of distances or angles. Hence all drawing has to be done "by eye", and although the primitives allow bar graphs and pie charts to be drawn, their proportions cannot be accurate. However, Clares expect soon to offer a business graphics package, the output of which will be capable of being imported into GW.

In GW, there can be up to eight object graphics in the machine, but they are all held in one file, and there is no provision for merging such files. However, with multiple copies, you can have up to 64 graphics (objects and sprites) in all. The graphics are shown in Preview with an aspect ratio twice as high as when painted or drawn, and truncated at the bottom, but they are still recognizable, and print out correctly. (see Fig. 3).

## Page Composition

GW does not allow text to "flow" around graphics, as in a desktop publishing package. Instead, you have to shape the text with rulers, before or after positioning the graphic. However, this does allow you to have text overlapping the graphic – eg as legends or labels – (though only in the standard font), which partly makes up for the lack of any text capability in the GW graphic editor. Graphics in colour can be seen only with "greeked" text, and this "Mini Preview" cannot be scrolled.

In GW, sprite graphics cannot exceed about 90 per cent of the screen width, and about the full screen depth, when using a 9-pin Epson printer. Moreover, sprites cannot be scaled, or "cropped" within GW. To stay within the same limitations, object graphics can be scaled in Page Composition – either differently in X and Y, or retaining their original aspect ratio (ie as drawn). You can place an object graphic on top of a sprite graphic or vice versa – and show them thus in Preview, and on printout.

## Printing

GW is designed to use Epson and compatible 9-pin dot-matrix printers – preferably those with "plotter graphics", such as the FX series. While GW documents can include graphics, the standard text font, at 10 characters per inch, is used for printing text. It defaults to "draft" (with bold, italic etc. styles), but can also use NLQ (where available), either by running the PRINTCON configuration program (to change the default), or by switching at the printer. However, you can only use (or re-assign) the styles provided, and cannot insert other printer codes in the text. GW can also use almost any other printer, provided that you modify the printer codes (for bold etc), with the PRINTCON program supplied. This is easy to use, and requires the codes in simple decimal ASCII form.

GW supports the printing of graphics colours as shades of grey, but as yet no colour printers. However, Clares may well produce a driver for the Epson JX-80, with which the EX-800 with colour option is compatible.

## Documentation

The manual has 60 A5 pages, with a lay-flat spine, and both contents and index. However, with its use of menus and mouse, GW is easy to learn and to use, and a function key strip is provided. Supplementary information is included in the demonstration document on the distribution disc.

## Price and Availability

GW is priced at only £29.95, inc VAT, and is available now – both from dealers and direct from Clares.

## Acornsoft First Word Plus

*First Word Plus (FWP) was written by GST Ltd of Cambridge, and is already available on the Atari ST and the IBM-PC and compatibles, (running with the GEM window and mouse interface). They have now ported it to the Arc, running with the Acorn window and mouse interface, for marketing by Acornsoft.*

FWP requires at least 1 MB, but can take full advantage of eg 4 MB to hold one very large, or up to four smaller documents, and any number of sprite graphics. In an Arc 310, the maximum RAM free for documents etc is some 390 K. At 2 K per page of about 300 words, this corresponds to nearly 200 pages, or 60,000 words (eg a big report). Conversely, in a PC of 512 K under MS-DOS, it is only 118 K (or 246 K in a PC of 640 K), although the PC version can use "disc slaving" (like Wordstar) to handle larger documents. The extra RAM

Fig. 4 FIRST WORD PLUS MENU MAP

| | |
|---|---|
| File | Open file |
| | Print file |
| | Save file (and quit) |
| | Save as .. |
| | Save and resume |
| | Read file |
| | Write block |
| | Delete file |
| | Quit (document) |
| | Quit all (docs.) |
| Edit | Find |
| | Replace |
| | Repeat find |
| | Statistics |
| | WP mode |
| | Hyphenation |
| | Insert mode |
| | Word wrap |
| | Set mark |
| | Goto mark |
| | Goto page |
| Block | Start block |
| | End block |
| | Cut block |
| | Copy block |
| | Paste block |
| | Move block |
| | Find start |
| | Find end |
| | Hide block |
| Layout | Show ruler |
| | Show position |
| | Page layout |
| | Add ruler |
| | Delete ruler |
| | Read ruler |
| | Footnote format |
| | Add footnote |
| Style | Bold |
| | Underline |
| | Italic |
| | Light |
| | Superscript |
| | Subscript |
| | Centre |
| | Right (justify) |
| | Indent |
| | Reformat |
| Spelling | Load dictionary |
| | Check spelling |
| | Continuous check |
| | Browse |
| | Add word |
| | End spell check |
| Graphics | Graphics mode |
| | Read picture .. |
| | Delete picture |
| Help | Topics |

**The First Word Plus menu map lists all of the options contained within the package in a logical order.**

space in an Arc becomes especially valuable for documents containing graphics, or with the spelling dictionary loaded.

FWP supports documents up to 160 characters wide, displaying up to 74 columns by 24 lines in a window, and allows up to four documents to be displayed simultaneously, in separate windows. These open at default positions and sizes, but may all be re-positioned, and resized as usual. FWP looks very good on screen, with clear black text on white, and moderate use of colour. The active document has the title bar in red, while the others are light blue.

## Editing Text

FWP is controlled via the Arc window and mouse interface. Whereas the ST and PC versions, designed for a 2-button mouse, have the main menu displayed on the top line of the screen, the Arc version is designed for a 3-button mouse, of which the middle button brings up the main menu. This is a simple list of eight items, and sliding the pointer to the right brings up sub-menus. (See Fig. 4). These also show the corresponding Ctrl-key presses, where available, which is an excellent idea, since while doing it the slow way, you can also learn the short-cuts. It also makes up for the fact that they cannot all be shown on the function key strip.

The cursor flashes in the Arc version – an improvement on the ST and PC versions. Although FWP can operate in both Insert and Overwrite modes, the square cursor does not change. Instead, the status is shown on-screen, in a function key legend, like those for text style (bold etc). Legends for the (unshifted) function keys are displayed at bottom of screen by default, but the main window can be resized to full screen. However, a strip labelling all the function keys is also provided.

FWP can handle the international characters not shown on the keyboard by means of a menu normally hidden by the text window. This reflects the repertoire of the printer selected (of which the driver can include character substitution). Thus for the "standard backspacing printer", it shows only three lines of 32 characters, but for the Epson FX series, it shows six lines of up to 32 characters, including many international ones. When entering text, you can click on the character, and it will be entered at the cursor position. The standard Arc method of Ctrl-Shift, Alt, followed by a letter key, can also be used. The key for the letter you want may be found from the character menu, but three lines up, since they have ASCII numbers of 96 less). When searching, the special characters can only be entered from the keyboard.

Bold, normal and light text is shown in FWP by shades of grey. Styles, such as italic, underline, subscript and superscript, are shown on screen in edit mode. Unlike GW, FWP can also handle different (uniform, not proportional) character sizes (expanded, pica, elite, condensed), on different lines, and retain justification – though not display them. This is controlled by rulers, along with line spacing, but text is mono-spaced on screen, to avoid wasting space. However, since it provides an effective preview of most features in edit mode. FWP may be considered WYSIWYG.

Page breaks are shown only in the left margin, and with no headers or footers. However, FWP supports footnotes, which may be shown in a special window, and are tied to the text by a number. They may be added via a menu or function key, and later edited by double-clicking on the number. Footnotes are automatically renumbered, if others are inserted or deleted.

Like Wordstar, FWP keeps a copy of the previous version of each document in the directory BAK. There is no provision for issuing "star" commands, but there are facilities for cataloguing discs, determining the space free, and for deleting files. Incidentally to checking the free space, "Statistics", reached via a menu, or Ctrl-Z, also allows you to "mount" other discs.

Since FWP is already available for the Atari ST and the IBM-PC and compatibles, there is scope for transferring documents between these and the Arc, complete with all the format and style information held in control codes, rather than just as ASCII files. The key to this is the Arc PC Emulator, which comes with utilities to transfer files between the ADFS and MS-DOS disc formats. Furthermore, provided a disc is formatted under MS-DOS, for 720 K, it should be possible to read and write to it with an ST (though not vice versa).

## Mail Merging

FWP supports "form letter merge printing" (or mail merging). by means of a separate program called "First Mail". The FWP disc includes examples of a form letter, a data list, and a "command file" – all of which can be prepared in FWP. Other operations – from label printing to much more complex "merges" – are also possible with First Mail.

## Performance

Cursor movement and scrolling are acceptably fast in FWP, and exhibit no overshoot when the key is released. Scrolling seems to be little if any slower when graphics are enabled or displayed in the document. The times for several packages to perform certain operations with the Byte 4000-word document are shown in Fig. 2. That shown for scrolling in FWP is with no ruler or "cursor position" display (which would lengthen it), but for the maximum window size (where a smaller one would shorten it). Of these packages, ArcWriter, which uses "fancy" fonts, is the slowest at scrolling, while Inter-Word, Wordstar and Graphic Writer, which scroll fastest, do not use windows in edit mode. However, FWP on the Arc is quite acceptable. For comparison, First Word (not Plus) running on the Atari ST under GEM, took some 87 s, and FWP on a standard IBM-PC is even slower.

## Graphics and Page Composition

Sprites may be included in FWP documents, but as with GW, you need to configure the Spritesize to suit. They may be produced from any Arc graphics screen with *SCREENSAVE, or by any Arc "paint" program that produces compatible sprites, such as the (free) Welcome Paint, or Clares' Artisan. Of the two, ▶

Fig. 5 PRINTER PERFORMANCE

| | Draft | | Emphasized/NLQ/LQ | |
|---|---|---|---|---|
| | Action | Time | Action | Time |
| Epson FX-80 | 1-pass | 4 m | 1-pass | 6 m 5 s |
| Epson EX-800 | 1-pass | 2 m 16 s | 2-pass | 7 m 43 s |
| Epson LQ-500 | 1-pass | 4 m | 1-pass | 9 m 20 s |

**The printer performance chart for the Epson FX-80, the EX-800 and the LQ-500 are all shown above, with their Draft-NLQ benchmarks following.**

Artisan is easier to use, and has a larger work area. Also, it has an in-built zoom feature, with a pixel editor, whereas with Welcome Paint, you have to load your picture into the separate Sprite Editor program.

Depending on the originating program, sprites may or may not be saved with their own palettes. Yet, when loaded into FWP, they adopt the FWP palette for on-screen display. This is done because different pictures could well each have their own palettes, and Mode 12 supports only 16 colours in all. However, the printout will still reflect the individual palettes, subject to the capabilities of the printer. Thus mono printers will interpret them as shades of grey, and a JX-80 (or compatible) printer will use up to eight colours (including white). This point may be confirmed with the Printtest document, which includes a picture produced using Welcome Paint, with labelled squares of colour. Of course, if the "paint" program does not output the palette with the sprite data, then the picture will be printed according to the FWP palette. However, it is possible to load the FWP palette into both Welcome Paint and Artisan, in order to avoid surprises at the final printout.

By shaping the text with rulers, you can put text and graphics alongside each other in FWP, and not just on different lines, as in GEM Write. Graphics may be placed to the nearest character position, and text can overlay the graphic – eg as labels. As with GW, you cannot crop sprite pictures in FWP, but the data is truncated at the right-hand edge if necessary, on printout. Like GW, FWP documents contain only pointers, as opposed to the actual graphic data. However, holding all the graphics as sprites enables both the text and graphics to be displayed in colour, and scrolled and edited. Relative to the text, pictures are somewhat smaller on screen than on printout, due to the respective character sizes. However, the aspect ratio is correct in both cases (see figure 6).

## Printing

FWP comes with drivers for a wide range of printers – FX etc 9-pin and LQ 24-pin dot-matrix, GQ (laser) page, and several daisy-wheel machines (for text only). You can edit the existing FWP printer drivers, to re-assign the existing styles, but you cannot insert other printer codes in the text. It is easy to select the required driver for each session, and also to change the default driver if required.

In addition to printing graphics colours as shades of grey with mono printers, FWP includes a driver for the Epson JX-80, with which the EX-800 with colour option is compatible. I have confirmed that this can produce eight colours (including white), which are the same as those used by the Model B/Master.

FWP allows the printer output to be toggled between the parallel and serial ports of the Arc. It also allows you to initiate printing which will then continue in background, while you open another file for editing.

## Printers

A 9-pin dot-matrix printer can achieve NLQ text and high-resolution graphics, but only by making more than one pass – which makes it slow. A 24-pin printer is appreciably better, while still being affordable to buy and to run. In the case of the Epson printers, the pins of the 9-pin machines are of 0.255 mm diameter, and in a single row, while those of the 24-pin machines are of 0.2 mm, arranged in two rows of 12. Hence, rather than 72 x 72 dots per inch horizontally and vertically, the latter can print graphics at from 60 x 60 up to 180 x 180 dpi. However, for high resolution and high speed, a page (eg laser) printer is really required.

## The EX-800

The Epson FX-80 is still regarded as the "standard" 9-pin dot-matrix printer, supporting "draft", "emphasized", and "double-strike" text, and bit-image graphics – including "plotter graphics", which preserves aspect ratio. However, it did not provide Near Letter Quality (NLQ) (eg by means of two different passes). This became available as an upgrade, and was incorporated as standard in later models – including the current FX-800. The EX-800 is a faster version of the FX-800, and at the top of the Epson 9-pin range. Hence it has an in-built push-feed tractor, which allows printing on the first sheet of fanfold paper. It also allows single sheets to be fed in, or maybe fitted with a sheet feeder. Alternatively, it may be fitted with a sheet feeder.

The self-test reports the settings of the DIP-switches (which is just as well, as they are somewhat inaccessible, at the back). However, "SelecType" buttons allow easy selection of font and size, which is particularly valuable for changing between draft and NLQ, without altering the document or printer driver. For a printer with only nine pins, the quality of the NLQ print is very good (see Fig. 3), while the speed of draft printing is especially impressive (see Fig. 5).

The EX-800 is almost twice as fast as an FX-80 or LQ-500 on draft, where all print in a single pass. It has less advantage on NLQ, where it takes two passes, compared with the LQ-800, which takes only one. As a fast printer, the EX-800 is not quiet on draft, although a half-speed setting is available via software, and NLQ printing is slower and quieter. It is also capable – with an extra-cost option – of printing in colour (emulating the earlier JX-80).

As an FX-compatible printer, capable of fast output of graphics, the EX-800 is particularly well-suited to GW. If the JX colour driver for GW materialises, it will become even better. The EX-800 is equally suitable for FWP, which comes with drivers for both FX and JX printers.

## The LQ-500

The Epson LQ series are 24-pin printers, offering both text and graphics of even better appearance, and in a wider choice of fonts, usually with still higher speed. Of these, the LQ-500, costing less than the FX-800, is particularly competitive in price for a 24-pin machine. As such, the LQ-500 has an pull-feed tractor as standard, which requires that the first sheet of fanfold be wasted each time. Neither does it allow single sheets to be fed in without having to unthread the fanfold. However, it has a single sheet guide, and can be fitted with a sheet feeder. All other models

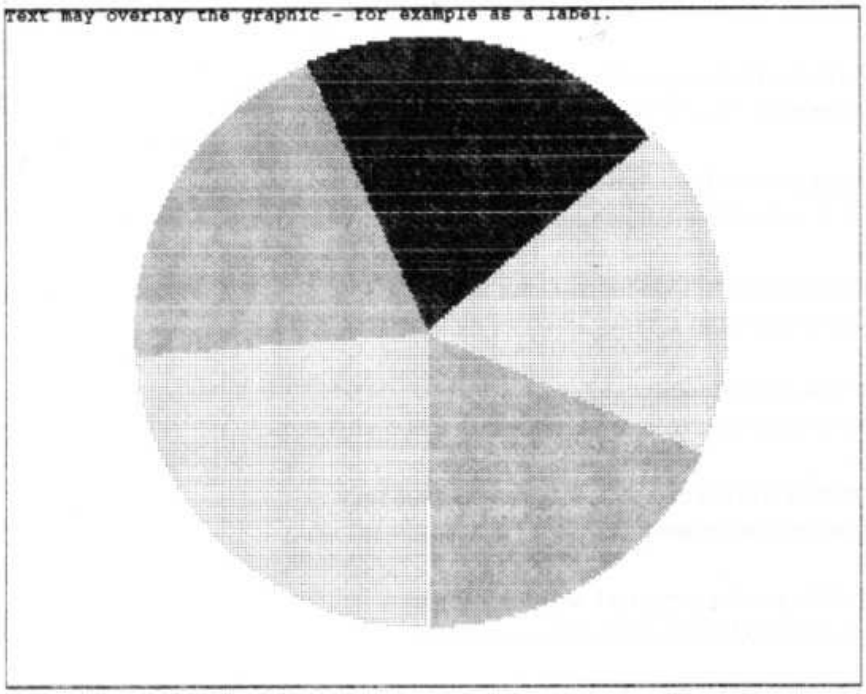
DEMONSTRATION PAGE OF FIRST WORD PLUS WITH THE LQ-500 PRINTER

This is text using the LQ Courier normal characters of Pica size.
The style may be plain, *italic*, underlined, *underlined italic*,
light, subscript or superscript.

**This is text using the LQ Courier bold characters of Pica size.**
**The style may be plain, *italic*, underlined, *underlined italic*,**
**subscript or superscript.**

Text in all the above styles may also be of Elite size,
Expanded size,
and Condensed size, controlled by rulers.

This is a sprite graphic, which prints larger on this printer.
Such graphics always retain their original aspect ratio.
Text may overlay the graphic - for example as a label.



**A sample dump from the LQ-500 printer using First Word Plus – Note, this is not built into the printer itself!**

of the LQ range, from the -850 to the -2500+, have push-feed tractors, and "two-way" paper handling, which overcomes these limitations, but even the -850 costs some 60 per cent more!

The self-test reports the settings of the DIP-switches, which on the LQ-500 are reasonably well-placed, at the right rear corner, beneath a clip-on cover. The optional font module also fits here. The appearance of text in the standard Roman or Sans Serif LQ font is excellent, and that produced with the optional Courier font module is even better, and very close to that of a daisy-wheel (see Fig. 6). The standard fonts also include Shadow and Outline, and these may be combined. The LQ range is also capable of a range of character sizes, from 15 cpi, through Elite and Pica, to double width with double height. Although the graphics are larger than with the FX driver, it can offer more shades of grey, because more than one mode gives an aspect ratio of unity.

The printing speed is quite adequate for home and light business use (see Fig. 5). The noise is higher-pitched than for 9-pin printers, and there is no half-speed setting. However, LQ printing is slower, and therefore quieter than draft. The LQ range has several more expensive models, capable of higher speeds. The LQ-2500+ is also capable – with an extra-cost option – of printing in colour (emulating the JX-80).

The LQ-500 is well-suited to FWP, which comes with an LQ printer driver. While GW can use it to produce text, I did not know the codes for 24-pin graphics, and was therefore not able to output graphics.

## Prices and Availability

The EX-800 is priced at £555, with the optional colour unit at £60.50, both plus VAT. The LQ-500 costs £385, and the optional font module £44, again plus VAT. All are available now from dealers.

## Conclusions

Viewed as only a word processor, Graphic Writer is less capable than Inter-Word. However, (at £29.95 inc VAT) it is also less expensive than I-W on the Model B/Master (£49 plus VAT), and may be much less than I-W on the Arc (£39 plus VAT), depending on whether the backplane (£39 plus VAT extra on a 300 series), and the ROM Podule (from around £60 plus VAT) is charged against it. Viewed as a graphics package, GW has fewer facilities (eg no text) than Clares' own pixel-based "painting" package, Artisan. However, object-based graphics are scalable, and thus more suitable in some cases.

First Word Plus, which uses the full Arc windows and mouse interface, may be compared with Arcwriter, which also uses the fancy, anti-aliased fonts on-screen, but not for printing, and also with Inter-Word on the Arc. FWP is a more capable word processor than ArcWriter, with an integrated spelling checker, and able to handle larger documents, due to the RAM space needed for the fancy fonts, while it may be less expensive than Inter-Word, if the backplane and ROM Podule are included. Compared with GW, FWP will also accept pixel-based graphics from Welcome Paint, Artisan, and other "painting" programs, and has almost as much freedom of page composition (lacking only scalable graphics), and offers better support for a wider range of printers.

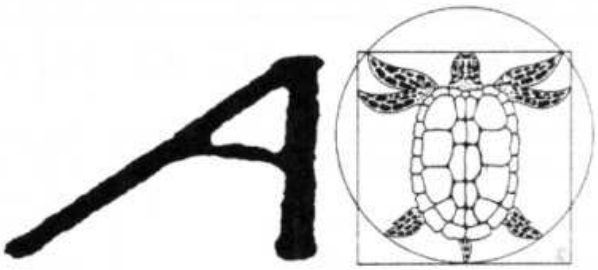
Both of these document processors are designed to work with dot matrix printers, though they also support daisy-wheel printers for text-only, and can use page (eg laser) printers. The Epson EX-800, as a fast 9-pin machine compatible with the FX series, and with a JX-compatible colour option, is well-suited to both GW and FWP, while the Epson LQ-500, as a very competitive 24-pin printer, produces excellent results from FWP, and soon will from GW as well. Since these document processors require both text and graphics output, both printers are also very suitable for use with other applications software.

### Factfile

**Acornsoft are at: 645 Newmarket Road, Cambridge, CB5 8PD. ☎ (0223) 214411.**

**Clares' Micro Supplies are at: 98 Middlewich Road, Northwich, Cheshire, CW9 7DA. ☎ (0606) 48511.**

**Epson (UK) Ltd. are at: Dorlan House, 388 High Road, Wembley, Middlesex, HA9 6UH. ☎ (01) 902-8892.**



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Philip J. Colmer



# DFS TO ADFS

## DFS to ADFS transfer utility

This utility has been written to aid the transfer of files from previous BBC series machines to the Archimedes range. While a number of third party companies have now released means of connecting 5.25" drives to the Archimedes, there is still no way of transferring DFS discs to the Archimedes, other than utilising an existing BBC computer.

The program detailed below overcomes this problem by using the low-level SWI call, ADFS–DiscOp, provided by the Advanced Disc Filing System. This call is documented, although rather obscurely, in the Programmer's Reference Manual and I would direct your attention there if you require further information on the call.

The idea of the program is to read an entire disc into the memory of the Archimedes and then save the appropriate parts on to an ADFS disc (even a hard disc) – thus achieving DFS to ADFS transfer.

## Options

On running the program, you are presented with a five option menu, controlled by the mouse. By moving the pointer around the screen, you can highlight the available options or change the selected transfer drives. The latter are displayed at the bottom of the screen and automatically reflect the number of drives connected to your Archimedes.

One point which should be made clear at this stage is the nomenclature used for the DFS drives. Unfortunately, it was not possible to stay with the 0/2, 1/3 numbering system as this would only work for 2 floppy disc drives and it is possible to connect up to 4 floppy disc drives to an Archimedes. Thus, the naming system is as follows – for drive 0, the two surfaces are named A and B; for drive 1, the two surfaces are named C and D; and so on. The nomenclature for the Archimedes drives is as normal, ie 0-3 for floppy drives, 4-7 for hard drives.

The drives are selected by placing the pointer over the appropriate box and pressing the left hand button on the mouse. This highlights the box. To select a menu option, move the pointer over the option so that it becomes highlighted. Then press the left hand button on the mouse. If you are asked at any time to press a mouse button to continue, then pressing the LEFT hand button will do so while pressing either of the other buttons will cancel the operation and return you to the main menu.

The menu options perform the following functions:

**INTRODUCTION** This simply produces some explanatory text regarding the utility.

**CATALOGUE A DFS DISC** This attempts to catalogue a DFS format disc in the selected DFS drive. You will be prompted to place a DFS disc in the appropriate drive, after which you should press a mouse button. The DFS catalogue will then be read and displayed. You should then press a mouse button to continue.

**CATALOGUE AN ADFS DISC** This attempts to catalogue an ADFS format disc in the selected ADFS drive. You will be prompted to place an ADFS disc in the appropriate drive, after which you should press a mouse button. The ADFS catalogue will then be displayed. You should then press a mouse button to continue.

**TRANSFER FILES FROM A DFS DISC TO AN ADFS DISC** Upon selecting this option, the utility will ask you to place the DFS disc in the appropriate drive. If the selected ADFS drive is different from the DFS drive (and it is not a hard disc) then the utility will prompt you to place the ADFS disc in the selected drive.

The utility will then read the entire DFS disc, displaying the catalogue as it does so. If the selected ADFS drive is the same as the DFS drive, you will then be prompted to place the ADFS disc in the drive. The utility will then attempt to create a directory in the root directory, named after the DFS disc. If the DFS disc had no disc title, then the name used will be NoName . If a directory already exists of that name, you will be prompted to enter a new name.

The utility will then attempt to save each of the DFS files. If any of the DFS files exist in directories, eg A, B, etc, then the appropriate ADFS sub-directory will be created. If a file already exists under the attempted name (probably due to the removal of characters from the filename which ADFS would not like) then you will be prompted to enter a new filename.

In actual fact, using the utility is a lot easier than describing it's operation. Provided that none of the DFS files have got any characters in which are illegal under ADFS (such as @), then the transfer of files from DFS to ADFS will be totally automatic.

## ♦ LISTING I ♦

```
   10REM > DfsToAdfs
   20REM
   30REM Written by Philip J
Colmer, January 1988
   40REM
   50DIM Data% 200*1024:REM
Maximum is one side of 80
track disc
   60DIM DiscRecord% 64
   70DIM
D_Name$(31),A_Name$(31)
   80DIM Dir$(31)
   90DIM Load%(31)
  100DIM Exec%(31)
  110DIM Length%(31)
  120DIM Start%(31)
  130DIM adfs_drives(5)
  140DIM dfs_drives(7)
  150REM ***** DO NOT CHANGE
v$ - USED BY SEVERAL
PROCEDURES *****
  160v$="0123456789"

170v$=v$+"abcdefghijklmnopqrst
uvwxyz"

180v$=v$+"ABCDEFGHIJKLMNOPQRST
UVWXYZ"

190v$=v$+"!_"+CHR$13+CHR$127
  200REM *****
  210MODE 0:OFF
  220*ALPHABET LATIN1
  230PROCcentre(0,"DFS to ADFS
Transfer Utility")
  240PROCcentre(2,CHR$(169)+"
1987 Philip J Colmer")
  250*ALPHABET BFONT
  260SYS "ADFS_Drives" TO
dest%,nf%,nh%
  270IFnf%<1 ERROR 1, "Not
enough drives"
  280dsize%=8:REM fixed at 80
tracks - # read dependent on
disc size%
  290FORi%=0TO7
  300IFi%<6
adfs_drives(i%)=FALSE
  310dfs_drives(i%)=FALSE
  320NEXT
  330FORi%=1TOnf%

340dfs_drives((i%-1)*2)=TRUE

350dfs_drives((i%-1)*2+1)=TRUE

  360adfs_drives(i%-1)=TRUE
  370NEXT
  380IFnh%>0
FORi%=1TOnh%:adfs_drives(i%+3)
```

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=TRUE:NEXT
  390source%=2:IFnf%<2
source%=0
400PROCdisplay_source:PROCdisp
lay_dest

410PROCinverse(0):CLS:o%=1:*PO
INTER
  420MOUSE TO 640,820
  430REPEAT
  440MOUSE RECTANGLE
16,0,1238,827
  450REPEAT
  460
PROCinverse(o%=1):PROCcentre(2
,"Introduction")
  470
PROCinverse(o%=2):PROCcentre(4
,"Catalogue a DFS disc")
  480
PROCinverse(o%=3):PROCcentre(6
,"Catalogue an ADFS disc")
  490 PROCinverse(o%=4)
  500 PROCcentre(8,"Transfer
files from a DFS disc to an
ADFS disc")
  510
PROCinverse(o%=5):PROCcentre(1
0,"Exit")
  520 MOUSE x%,y%,z%
  530 IF(y%<550)OR(y%>827)
o%=0
  540 IF(y%<828)AND(y%>800)
o%=1
  550 IF(y%<766)AND(y%>739)
o%=2
  560 IF(y%<701)AND(y%>677)
o%=3
  570 IF(y%<639)AND(y%>612)
o%=4
  580 IF(y%<575)AND(y%>549)
o%=5
  590 UNTILz%=4
  600 IFy%<94 THEN
  610  PROCfind_source
  620  PROCfind_dest
  630 ENDIF
  640 REPEAT
  650  MOUSE x%,y%,z%
  660 UNTILz%=0
  670 CASE o% OF
  680  WHEN 1: PROCintro
  690  WHEN 2: PROCcat_dfs
  700  WHEN 3: PROCcat_adfs
  710  WHEN 4:
PROCdfs_to_adfs
  720  OTHERWISE
  730 ENDCASE
  740UNTIL o%=5

750PROCinverse(FALSE):*POINTER
0
  760VDU26,12:ON
  770END
  780:
  790DEFPROCintro
  800LOCAL v%
  810CLS:*POINTER 0
  820PRINTTAB(0,2);
  830PROCp("This program
attempts to copy the files on
a 40 or 80 track")
  840PROCp("DFS formatted disc
onto an ADFS disc.")
  850PRINT'
  860PROCp("A directory is
created to hold these
programs. The name for this")
  870PROCp("directory is taken
from the title on the DFS
disc. If a directory")
  880PROCp("already exists
with that name, you will be
asked to enter another")
  890PROCp("name.
Sub-directories will be
created as required.")
  900PRINT'
  910PROCp("If a DFS directory
is required which is illegal
under ADFS, the")
  920PROCp("file will be
stored in the top level
directory.")
  930PRINT'
  940PROCp("Similarly, certain
characters allowed in DFS
filenames are not")
  950PROCp("allowed in ADFS
filenames and will be
ignored.")
  960PRINT'
  970PROCp("The DFS disc MUST
be used in the appropriate
size disc drive.")
  980PROCp("It is not possible
to double-step an 80-track
disc drive to read")
  990PROCp("a 40-track
disc.")
 1000PRINT'
 1010PROCp("YOU ARE ADVISED TO
WRITE-PROTECT THE SOURCE DISC
BEFORE")
 1020PROCp("CONTINUING.")
 1030PROCcentre(21,"Please
click a mouse button to
continue")
 1040v%=FNclick
 1050CLS:*POINTER
 1060ENDPROC
 1070:
 1080DEFPROCcat_dfs
 1090LOCAL v%
 1100CLS:*POINTER 0
 1110v%=FNprompt("DFS",source%
,TRUE)
 1120IFv%=4 THEN
 1130 PROCinit_disc_record
 1140 PROCread_directory
 1150 PROCcentre(21,"Please
click a mouse button to
continue")
 1160 v%=FNclick
 1170ENDIF
 1180CLS:*POINTER
 1190ENDPROC
 1200:
 1210DEFPROCcat_adfs
 1220LOCAL v%
 1230CLS:*POINTER 0
 1240v%=FNprompt("ADFS",dest%,
FALSE)
 1250IFv%=4 THEN
 1260 OSCLI("MOUNT
"+STR$(dest%))
 1270 CLS:*.
 1280 PROCcentre(21,"Please
click a mouse button to
continue")
 1290 v%=FNclick
 1300ENDIF
 1310CLS:*POINTER
 1320ENDPROC
 1330:
 1340DEFPROCdfs_to_adfs
 1350LOCAL v%
 1360CLS:*POINTER 0
 1370same%=((source% DIV
2)=dest%)
 1380v%=FNprompt("DFS",source%
,TRUE)
 1390IFv%=4 THEN
 1400 IFNOT(same%)
v%=FNprompt("ADFS",dest%,FALSE
)
 1410 IFv%=4 THEN
 1420  PROCinit_disc_record
 1430  PROCread_directory
 1440  IF files%<>0 THEN
 1450   PROCread_disc
 1460   IFsame%
v%=FNprompt("ADFS",dest%,FALSE
)
 1470   IFv%=4 THEN
 1480    CLS
 1490    PROCcreate_directory
 1500    CLS
 1510    PROCcopy_files
 1520    *DIR $
 1530
PRINT''''TAB(0,19);"Finished."

 1540   ENDIF
 1550  ENDIF
 1560  PROCcentre(21,"Please
click a mouse button to
continue")
 1570  v%=FNclick
 1580 ENDIF
 1590ENDIF
 1600CLS:*POINTER
 1610ENDPROC
 1620:
 1630DEFFNprompt(n$,d%,l%)
 1640LOCAL v%
 1650IF(d%>3) AND NOT(l%)
THEN
 1660 v%=4
 1670ELSE
 1680 n$="Please place the
"+n$+" disc in drive "
 1690 IFl% n$=n$+CHR$(65+d%)
ELSE n$=n$+CHR$(48+d%)
 1700 n$=n$+" and click a
mouse button"
 1710 PROCcentre(21,n$)
 1720 v%=FNclick
 1730 PRINTTAB(0,22);SPC(79);
 1740ENDIF
 1750=v%
 1760:
 1770DEFPROCinit_disc_record
 1780LOCAL i%
 1790DiscRecord%?0 = 8:REM
Log2 of the sector size
 1800DiscRecord%?1 = 10:REM
Number of sectors per track
 1810DiscRecord%?2 = 1:REM
Number of heads
 1820DiscRecord%?3 = 1:REM
Single density
 1830FOR i% = 4 TO 60 STEP 4
 1840 DiscRecord%!i% = 0
 1850NEXT
 1860DiscRecord%!16 =
(dsize%*10)*10*256*2:REM Disc
size in bytes
 1870ENDPROC
 1880:
 1890DEFPROCread_directory
 1900LOCAL i%
 1910CLS
 1920PROCread_track(Data%,0)
 1930title$=FNstring(Data%,8,T
RUE)+FNstring(Data%+256,2,TRUE
)
 1940IFtitle$=""
title$="NoName"
 1950PRINT"Disc title:
```

```
";title$'
 1960files%=Data%?261 DIV 8
 1970disc_size%=Data%?262
 1980IFfiles%=0 PRINT"No files
present"
 1990FOR i%=1 TO files%
 2000
D_Name$(i%)=FNstring(Data%+i%*
8,7,FALSE)
 2010
A_Name$(i%)=FNstring(Data%+i%*
8,7,TRUE)
 2020 IFA_Name$(i%)=""
A_Name$(i%)="NoName"
 2030
PRINTD_Name$(i%);SPC(13);
 2040
Dir$(i%)=FNstring(Data%+i%*8+7
,1,TRUE)
 2050
Load%(i%)=FNload(Data%,i%)
 2060
Exec%(i%)=FNexec(Data%,i%)
 2070
Length%(i%)=FNlength(Data%,i%)

 2080
Start%(i%)=FNstart(Data%,i%)
 2090 NEXT
 2100PRINT
 2110ENDPROC
 2120:
 2130DEFPROCread_disc
 2140LOCAL tt%,i%
 2150IFdisc_size%=&90 tt%=39
ELSE tt%=79
 2160PRINT'"Reading track #";
 2170FORi%=1 TO tt%
 2180 PRINTTAB(15,VPOS);i%;
 2190
PROCread_track(Data%+i%*2560,i
%)
 2200NEXT
 2210ENDPROC
 2220:
 2230DEFPROCcreate_directory
 2240LOCAL f%
 2250*BYE
 2260OSCLI("MOUNT
"+STR$(dest%))
 2270REPEAT
 2280
f%=FNobject_exists("$."+title$
)
 2290 IFf%
title$=FNnew_title(title$)
 2300UNTIL NOT(f%)
 2310OSCLI("CDIR $."+title$)
 2320OSCLI("DIR $."+title$)
 2330ENDPROC
 2340:
 2350DEFFNobject_exists(t$)
 2360LOCAL r%
 2370IFt$="" =TRUE:REM illegal
directories are not allowed
 2380r%=OPENIN(t$)
 2390IFr%<>0 CLOSE#r%
 2400=(r%<>0)
 2410:
 2420DEFFNnew_title(t$)
 2430LOCAL s$
 2440PRINTTAB(0,28);"A
directory already exists with
the name "+t$
 2450PRINT"Please enter a
replacement name (up to 10
chars only): "
 2460s$=FNget_s(10)
 2470PRINTTAB(0,28);SPC(240);
 2480=s$
 2490:
 2500DEFFNnew_name(t$)
 2510LOCAL s$
 2520PRINTTAB(0,28);"A file
already exists with the name
"+t$
 2530PRINT"Please enter a
replacement name (up to 12
chars only): "
 2540s$=FNget_s(12)
 2550PRINTTAB(0,28);SPC(240);
 2560=s$
 2570:
 2580DEFPROCcopy_files
 2590LOCAL i%,o$,f%
 2600FORi%=1 TO files%
 2610 IF
NOT(FNobject_exists(Dir$(i%)))
OSCLI("CDIR "+Dir$(i%))
 2620 REPEAT
 2630  o$=""
 2640  IFDir$(i%)<>""
o$=o$+Dir$(i%)+"."
 2650  o$=o$+A_Name$(i%)
 2660
f%=FNobject_exists("$."+o$)
 2670  IFf%
A_Name$(i%)=FNnew_name(A_Name$
(i%))
 2680 UNTIL NOT(f%)
 2690 o$="SAVE "+o$+"
"+STR$~(Data%+Start%(i%)*256)+
"+"
 2700
o$=o$+STR$~(Length%(i%))+" "
 2710 o$=o$+STR$~(Exec%(i%))+"
"
 2720 o$=o$+STR$~(Load%(i%))
 2730 PRINT"Copying
";D_Name$(i%);" as
";A_Name$(i%)
 2740 OSCLI(o$)
 2750NEXT
 2760ENDPROC
 2770:
 2780DEFPROCread_track(b%,t%)
 2790REM b% = buffer for
sector
 2800REM t% = track
 2810LOCAL r%,h%,d%, reason%,
disc_address%
 2820d%=(source% DIV 2):REM
calculate ADFS drive number
 2830h%=(source% MOD 2):REM
calculate head number
 2840t%=((h%*dsize%*10+t%)*10)
*256:REM calculate track
number
 2850reason%=1+(DiscRecord% <<
6)
 2860disc_address%=t%+(d% <<
29)
 2870DiscRecord%?34=d%:REM
undocumented feature!
 2880SYS
"XADFS_DiscOp",0,reason%,disc_
address%,b%,2560 TO r%
 2890IF r%<>0 ERROR 1,"Unable
to read data"
 2900ENDPROC
 2910:
 2920DEFFNstring(b%,s%,f%)
 2930REM b% = buffer
 2940REM s% = size
 2950REM f% = TRUE if trapping
illegals else FALSE
 2960LOCAL s$,c%
 2970s$=""
 2980REPEAT
 2990 c% = ?b% AND 127
 3000 IFf% THEN
 3010
IFINSTR(LEFT$(v$,LEN(v$)-2),CH
R$(c%))<>0 s$=s$+CHR$(c%)
 3020 ELSE
 3030  s$=s$+CHR$(c%)
 3040 ENDIF
 3050 b%+=1
 3060 s%-=1
 3070UNTILs%=0
 3080=s$
 3090:
 3100DEFFNload(b%,n%)
 3110REM b% = buffer
 3120REM n% = file number
 3130REM low 8 bits are in
location 8
 3140REM middle 8 bits are in
location 9
 3150REM top 2 bits are
ignored
 3160= ?(b%+256+n%*8) +
?(b%+257+n%*8)*256
 3170:
 3180DEFFNexec(b%,n%)
 3190REM b% = buffer
 3200REM n% = file number
 3210REM low 8 bits are in
location 10
 3220REM middle 8 bits are in
location 11
 3230REM top 2 bits are
ignored
 3240= ?(b%+258+n%*8) +
?(b%+259+n%*8)*256
 3250:
 3260DEFFNlength(b%,n%)
 3270REM b% = buffer
 3280REM n% = file number
 3290REM low 8 bits are in
location 12
 3300REM middle 8 bits are in
location 13
 3310REM top 2 bits are
ignored
 3320= ?(b%+260+n%*8) +
?(b%+261+n%*8)*256
 3330:
 3340DEFFNstart(b%,n%)
 3350REM b% = buffer
 3360REM n% = file number
 3370REM low 8 bits are in
location 15
 3380REM top 2 bits are in
location 14
 3390= ?(b%+263+n%*8) +
((?(b%+262+n%*8) AND 3)<<8)
 3400:
 3410DEFFNget_s(l%)
 3420LOCAL a$,f%,s$
 3430s$=""
 3440f%=FALSE
 3450WHILE NOT(f%)
 3460 a$=FNget_c
 3470 CASE a$ OF
 3480  WHEN CHR$13:   f%=TRUE
 3490  WHEN CHR$127:
IFLEN(s$)>0 THEN
 3500
s$=LEFT$(s$,LEN(s$)-1):VDU8,32
,8
 3510                ELSE
 3520                 VDU7
 3530                ENDIF
 3540  OTHERWISE IF LEN(s$)=l%
THEN VDU7 ELSE s$=s$+a$
 3550 ENDCASE
 3560ENDWHILE
 3570=s$
 3580:
```

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# T R A N S P O R T E R

```
 3590DEFFNget_c
 3600LOCAL a$,f%
 3610ON
 3620REPEAT
 3630 a$=GET$
 3640 f%=INSTR(v$,a$)
 3650 IFf%=0 VDU7
 3660UNTIL f%<>0
 3670OFF
 3680PRINTa$;
 3690=a$
 3700:
 3710DEFPROCbox(c%,t%,n%,l%)
 3720LOCAL x%
 3730IFn%<10 x%=1 ELSE x%=2
 3740PROCinverse(c%)
 3750VDU31,t%,29,163
 3760PRINTSTRING$(x%,CHR$(166)
);
 3770VDU165,31,t%,30,169
 3780IFl% VDU65+n% ELSE
VDU48+n%
 3790VDU169,31,t%,31,170
 3800PRINTSTRING$(x%,CHR$(166)
);
 3810VDU172
 3820ENDPROC
 3830:
 3840DEFPROCdisplay_source
 3850LOCAL d%
 3860VDU26:PROCinverse(FALSE)
 3870PRINTTAB(1,27);"DFS
drive"
 3880FORd%=0TO7
 3890IFdfs_drives(d%) THEN
PROCbox((source%=d%),1+d%*4,d%
, TRUE)
 3900NEXT
 3910PROCwindow
 3920ENDPROC
 3930:
 3940DEFPROCfind_source
 3950LOCAL s%
 3960IF(x%<384) THEN
 3970 s%=(x%-16)DIV 60
 3980 IFdfs_drives(s%)
source%=s%:PROCdisplay_source
 3990ENDIF
 4000ENDPROC
 4010:
 4020DEFPROCdisplay_dest
 4030LOCAL d%
 4040VDU26:PROCinverse(FALSE)
 4050PRINTTAB(69,27);"ADFS
drive"
 4060IFadfs_drives(dest%)=FALS
E dest%=0
 4070FORd%=0TO5
 4080IFadfs_drives(d%)
PROCbox((dest%=d%),56+d%*4,d%,
FALSE)
 4090NEXT
 4100PROCwindow
 4110ENDPROC
 4120:
 4130DEFPROCfind_dest
 4140LOCAL s%
 4150IF(x%>895) THEN
 4160 s%=(x%-896)DIV 60
 4170 IFadfs_drives(s%)
dest%=s%:PROCdisplay_dest
 4180ENDIF
 4190ENDPROC
 4200:
 4210DEFPROCcentre(l%,s$)
 4220PRINTTAB(40-LENs$DIV2,l%)
;s$
 4230ENDPROC
 4240:
 4250DEFPROCinverse(c%)
 4260IFc% COLOUR0:COLOUR135
ELSE COLOUR7:COLOUR128
 4270ENDPROC
 4280:
 4290DEFPROCwindow
 4300VDU28,0,26,79,4
 4310ENDPROC
 4320:
 4330DEFFNclick
 4340LOCAL x%,y%,z%,v%
 4350REPEAT
 4360 MOUSE x%,y%,z%
 4370UNTILz%<>0
 4380REPEAT
 4390 MOUSE x%,y%,v%
 4400UNTILv%=0
 4410=z%
 4420:
 4430DEFPROCp(s$)
 4440LOCAL i%
 4450REPEAT
 4460i%=INSTR(s$," "):IFi%=0
i%=LEN(s$)
 4470IFi%+COUNT>79 PRINT
 4480PRINTLEFT$(s$,i%);:s$=MID
$(s$,i%+1)
 4490UNTILs$=""
 4500VDU32
 4510ENDPROC
```

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# Archimedes Disc Magazine

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**Archieball**
– arcade quality breakout game
**Transfer**
– RS423 transfer programs
**Battleships**
– two computer game
**ARM Paint**
– full screen upgrade for this Welcome utility
**Graphics demonstrations**

## Red Keys Issue Two

**Life**
– ARM assembler, mouse control – Life as it's never been seen before!
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– full control over all Modes. Saves palette configuration for your own programs.
**DFS to ADFS**
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Dave Somers



# ON LINE

## Your comms column is now one year old

### Artslink International

In sixteen short months Artslink International has taken arts administration all over the world into the era of communication for the 1990s – electronic mail and all its attendant aids.

A worldwide membership of over 300 users in 12 countries now includes the Royal Opera House in Covent Garden, the Metropolitan Opera in New York, eight leading American orchestras, and major orchestras in the United States, Germany, Hong Kong, and Northern Ireland. Other subscribers include record companies, publishers, individual artists and now the Arts Council of Great Britain and all the regional Arts Associations in this country. At the current time, membership is growing at a rate of 150% per year.

Artslink International operates on Telecom Gold, and charges a monthly £7.50 fee in addition to the usual Telecom Gold connect and data transfer charges.

Arts administrators rarely have large staffs and are often worked off their feet. A company or orchestra on tour presents particular communications problems as managers are often travelling with the company and need to be in constant touch with their offices at home base. A portable terminal which fits into a briefcase can be supplied by Artslink International with a telephone coupler which can be used in almost any country with normal telephones and a user can receive his electronic mail or telex within minutes of arriving at any airport, hotel, or office.

Stephen Remington, the director of the Sadlers Wells theatre, has been a member of Artslink International for 16 months. He said: "Artslink is one of the most exciting recent developments in the administration of the performing arts. International communications have been revolutionised for artists, managers and companies on tour, I throughly recommend the service." Michael Emmerson, President of RCA Red Seal International: "I have three bases of operation, New York, Munich, and London; I simply could not operate as I do now without Artslink International. It is my prime source of communication with our offices all over the world."

In addition to the Artslink email, the possibilities of the service are boundless. An online newsletter service can incorporate members press releases, the database has lists of services including programme notes, music copying, recording engineers, and producers and lists of artists and their representitives in the UK, not forgetting agents and orchestras in Europe. In the future, members will be able to look up any international artist and see his agent, his repertoire list and biography displayed on the terminal.

Artslink International is the brainchild of Ambrose Miller and John Beadle. Both have pursued highly successful careers as arts administrators in different fields. Miller was Manager of the Royal Ballet Ensemble and Artists' Manager for the Clarion Concert Agency whilst John Beadle had played in all the London orchestras as a percussionist. He was appointed Orchestra manager of the Sadlers Wells, Royal Ballet in 1981.

● Artslink International can be contacted at, 39 Islington Park Street, London, N1 1QB. Telephone 01-359 5400, Telex 265871 MONREG G ref. MUS001, Telecom Gold 74:MUS001.

## Dacom Now Offers High Speed Modems

Dacom Systems Ltd is launching three new modems to join its successful CDS V23 "Trellis" Modem in providing what they class as reliable and cost-effective high-speed data communications.

Fully compatible with CCITT standards, the V29 and V29 fast poll modems offer full duplex operation at 9600 bps, with the V33 modem offering 14400 bps, over four wire leased lines. All three feature automatic adaptive equalization to quickly respond to changes to line conditions and thereby optimize performance. Comprehensive local and remote diagnostics ensure fast and simple fault-finding without the need for additional equipment.

For network applications, the V29 and V33 modems can be supplied with an additional time division multiplexer (TDM) for four and six channels respectively. The V29 modem fast poll modem is designed to achieve maximum throughput on multipoint circuits and can fast poll in just 7.5 milliseconds.

● Contact Dacom System Ltd, 26-27 Heathfield, Stacey Bushes, Milton Keynes, MK12 6HR. Telephone (0908) 322322.

**Dacom's new range of modems**

# MICRONET

## Micronet Launches New Business Service On Prestel

Micronet has recently launched an information service aimed at the small businessman. Called Bizznet, the service includes everything from online tax and legal advice to information about pension schemes, money, and stocks and shares – very useful in these turbulent days of the stock market.

Online tax and legal advice are just two of the interactive features of Bizznet. Users can send experts questions electronically and then read the replies on their micros at home, or on their terminals in the office. An online accountancy service, run by MAS, is also on offer. Other topics covered on Bizznet include insurance, investments, DHSS, running a small business, start-up schemes and property.

Bizznet, together with other services available on Prestel, becomes part of an extremely attractive package for the businessman. Prestel offers telex, email, company search facilities, stocks and shares prices, travel information, tele-broking, and more.

Although already well established on Micronet – Bizznet has been available to Micronet subscribers for over a year – the launch on Prestel brings with it over 50,000 new readers. Micronet subscribers will continue to receive Bizznet as part of their subscription, but Prestel only members will pay an additional 4p a minute for accessing the service.

Said Simon D'Arcy, "Anybody who intends to use Bizznet on a regular basis would be wise to join Micronet as well. In addition to free Bizznet we offer them machine specific databases for a variety of computers, including the Beeb, it also has access to Telecom Gold via Micronet's Interlink gateway.

## New Width To Shades Playing

Shades, the multi-user adventure game on Micronet, will shortly be available to Micronet subscribers in an 80 column scrolling text format. Only accessible in a customised 40 column Viewdata mode, the enhancement means players will benefit from faster gameplay and more screen information.

Since its launch a year ago; Shades has become one of Micronet's most popular services, and currently clocks up between 3000 and 3500 hours of playing time a week.

"Multi-user games are the logical progression for serious game players to make," says Micronet's Technical Director Mike Brown, "and the success of Shades points to a bright future for Micronet as the UK's leading operator of multi-user games."

The new scrolling version of Shades will cost 2p a minute to players. The price of viewdata Shades remains unchanged at 1.62p a minute.

For further information, just key *SHADES#.

## Contact!

Please remember, that this column is for you, and as such, any input from you is always most welcome. Any comments and suggestions should be sent to me at the below address by writing to me directly at **A&B Computing, No 1 Golden Square, London, W1R 3AB.**

If you have any problems communicating, then contact me and I will try and help you out. New sysops who would like details of their board to be mentioned should also contact me, giving full details of their board and, if possible, a voice telephone number.

● Telecom Gold (Dialcom) mailbox 72: MAG11090 ● Prestel mailbox 819990565 ● EpniMail mailbox 868396 ● Telex 265871/265451 MONREF G, Attention 72:MAG 11090 ● InterSpan. Send messages to organisation: DAVE SOMERS.

● Via Sirius BB, on 01-542 3772, online Saturdays 1900-0200 hrs, Sundays 1200-0200hrs, and Mondays 1900-0200 hrs. Please observe these operating times!

● Via Mektronic Consultants Computer Line on 061-773 7739, 24 hours a day. (At the main menu type M A 14 to take you straight to the A&B messaging section.)

● Via Swafax 3 on telephone 0622-858304, 24 Hours a day, 1200/75. NB. viewdata software is required.

Until next month, bye!

# TELECOM GOLD

## Telecom Gold Moves To Glasgow

Telecom Gold's Scotland and Northern Ireland regional offices have moved to bigger premises in Glasgow. Sales Consultant, Isabel Gray and her staff can be contacted on (041) 221 4000.

## Tandata's High Speed Test Database In Use

Tandata's special database, enabling prospective customers of its new V22/V22 bis modem, the Tm722, to try out communications at 2400 baud, is now in operation.

*"In setting up this database, it is our intention to demonstrate to prospective customers of the benefits of high speed data transmission and the reliability of the Tm722 in coping with these higher speeds of access in both originate and answer modes"* explains Dr. Stephen Hart, Head of Tandata's Modem Marketing Department.

The database is available by dialling (0684) 892 424. At the host end the Tm722 is set in auto reliable mode, the software working at 7 bit, even parity, 1 stop bit (7E1). The password, when asked for, is (surprise, surprise!) "*Tandata*". Following a successful log on, a short file will be sent by the host and users can test data transfer by sending their own file (or their own set of characters) which will be echoed back on their screen.

To end the session, or drop the line, simply send, <Ctrl> C followed by BYE and a carriage return (CR).

The Tm722 is ideal for any dial up communications requirement at 2400 or 1200 baud including file transfer, wide area networks, and on line databases for electronic mail services, it is also eminently suitable for other private and public databases, either by direct dial or via networks.

Almost all networks are now accessible at these higher speeds including Prestel, Istel, Fastrak, PSS, and IBM. Prestel users in Scotland, Liverpool, and Reading can already access the service at 2400 baud, and by the end of the year, all nodes are expected to be available via V22/V22 bis thanks to VASSCOM.

The Tm722 modem was reviewed in September's *Online* page 27.

● Tandata Communications are at, Albert Road North, Malvern, Worcs, WR14 2TL. Telephone (0684) 892421, Telex 337617, Prestel page £77 , Telecom Gold 81:TAN003, and Fax (0684) 892422.

## Lower Price for Dialup Educational

PMS have recently announced a £30 price reduction on the price of DIALUP Educational (reviewed in OnLine May 1087). The package now costs £59.95.

With the price cuts, the modem to micro cable and the tutorial are withdrawn from the DIALUP Educational package.

DIALUP is one of the few communications packages tailored for Educational use. It has the special TTNS emulation needed to access the Time network for schools, plus Viewdata and TTY emulation. You can now use one package to access the majority of Educational services and databases including, Prestel Education, NERIS, EpniDesk, TTNS, as well as Telecom Gold. The software also supports EPAD error correction.

DIALUP can be used with the DTI/TTNS modems (Tandata and Dacom) and a number of other manual and autodial modems. PMS can also supply a Miracle technology schools modem with DIALUP if required.

A special deal is available to LEA's on orders over ten copies.

Mary Branscombe



# STAR-LC10

## Star are back again with their LC-10 printer

Star have always been famed for their high quality printers, their firm construction, and fairly effortless Epson compatibility.

For the BBC Micro, Star printers have always fitted well into the user's environment. Sporting a Centronics interface, the printers' range of options have always been excellent.

The Star LC-10, a development of the earlier Star NL-10 machine, is finished in a BBC beige colour with a large, unhinged smoked acoustic/dust cover. Its low profile almost seems to want to hug the desk on which it is situated. The LC-10 is priced fairly and squarely at the budget end of the market, but with a strong air of efficiency and packed full of features.

What features? How about a NLQ option, *six* different fonts of Orator, Sans Serif, and Courier (and their respective italic settings), a high resolution dot matrix (the colour option also having a 23 by 18 dot resolution) and the usual features of Pica and Elite modes of printing.

The printer is capable of running at 144 characters per second in draft mode, and 36 cps in NLQ Elite.

The Star philosophy really comes into play with the front panel – all Star printers have been reasonably easy to use in the past – but with the LC-10, they really have outdone themselves by offering a front panel based on touch sensitive switches which are used to call up the various typefaces and styles, and to alter Pica and Elite pitches.

One very nice option is the Centronics connector fitted on the side of the printer, this means that the days of struggling with a connector plugged into some arcane corner of the back of the printer are no more. I'm all for Star's positioning of the Centronics port on the LC-10.

## Fixtures and Fittings

Provided as standard on the LC-10 colour printer is a push feed tractor, with short form tear-off – in real terms, this means that there is very little wasted paper. Should you be using this printer as a listings-only printer, then you will get every last line out of your paper.

A flimsy plastic support is used to clip onto the back. This is used to hold sheets of A4 paper, and as such can be used to print onto letterheaded paper or even blank sheets of paper. You can use this facility with tractor fed paper as it automatically aligns the paper going into the printer, and once in the feeder it doesn't tend to move.

There is the option of a cut sheet feeder at £65 – considerably cheaper than other sheet feeders, even from Star themselves!

## Using the Printer

Naturally the printer can be configured to suit a great many start up options. This is done by taking the acoustic/dust cover off and pushing the head off to the left hand side. There are the usual two sets of DIP switches which can be used to set up Epson or IBM printer settings. The LC-10 can emulate an FX/LX-80 printer well, even to the point of running some printer dumps.

One very perverse *feature* is that the self-test option does not work when the DIP switches are set to anything other than the the factory settings. This is fairly logical I suppose, but in order to initiate a self-test at any time you will have to reset the DIP options and start from a power-up.

## Conclusions

I was very impressed with the quality of the printout. There are a great many fonts that can all be accessed by using the DIP switches or by the usual methods via control codes.

The front panel is a revelation! It is easy to use, the fonts are instantly accessible, and the type styles are clear and readable – especially the Orator style.

Printing is reasonably quiet. It is still too loud to have in quiet environments (such as a library), but is perfectly suitable for the office or even in the home.

The sheet feeder and colour options make it a very versatile buy.

I would recommend the Star LC-10 if you are looking for a good, inexpensive dot matrix printer with a few frills and a variety of type styles. It sure beats buying NLQ ROMs for an Epson. It is certainly compatible with Beeb printer drivers, and is undoubtedly a printer to consider in your short list.

## Factfile

**Contact Star Micronics Ltd. Craven House, 40 Uxbridge Road, Ealing, London W5 2BS. ☎ 01-804 1800. Price £259 including VAT.**

Joe Coutts and Philip Poole.

# PROFILING IN VIEW

## Introduction

Data entry is as much part of computer usage as elegant programming. This short article tries to show that an assessment of the user's requirements and ease of data entry can be more important than computer power. Which has been said many times before. The application is "profile" preparation in a Secondary School.

## Easy Entry

Television adverts aimed at selling computers never hint at the data entry required for business applications, nor the programming behind the colourful swirling graphics. However these are very much a fact of computer life. Sometimes data entry can be made simple.

## Back to School

Recently we were involved in a project to computerise profile reporting in a Comprehensive School. The object is to assess process skills and report achievement using short sentences known as "can do" statements. A collection of these statements for a student gives a reasonably concise picture of what his progress is without saying what he has not achieved. The collection can be issued to parents as an end of term Report. For example in Science one statement might be: "Can measure a time interval with a stopwatch".

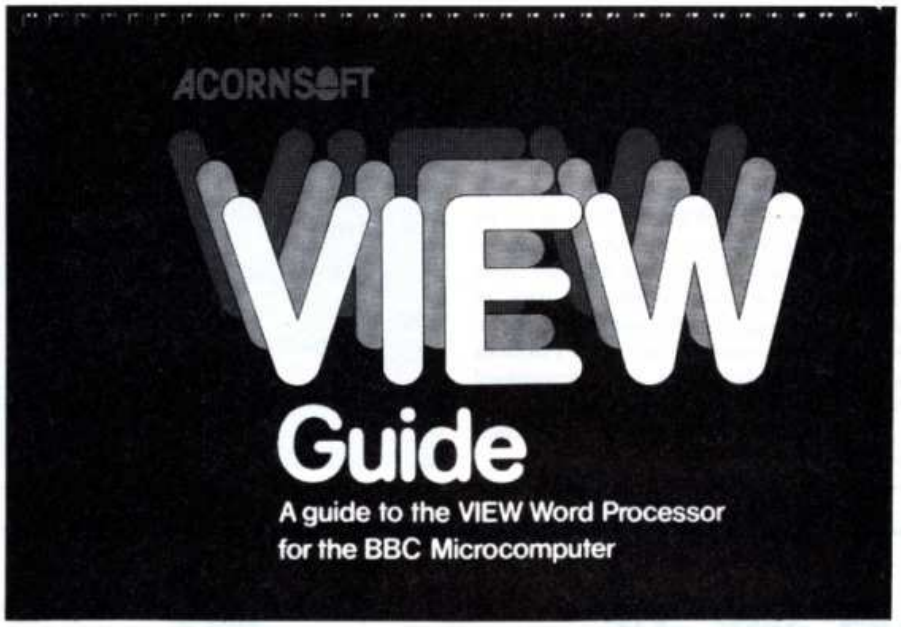
The computers at our disposal were BBC Master 128's, and all users of the final program would be of graduate standard, though probably new to computing. Electronic Data Storage was a possibility.

## Plan A

After some trial runs resulting in increasingly puzzled faces among the non-computer users, a completely new start was made. It was felt that simplicity of data entry was essential, and that printed records in the students' files were preferred to floppy disk storage. The Master 128 has a user defined keys storage of 1K,and has *VIEW* built in. This is the basis of the solution.

## Plan B

The call "*FX228,1" allows the soft keys to be used from within the Edit Mode of *VIEW* when CONTROL and SHIFT are pressed at the same time. The soft keys are the red keys




f0 to f9, the COPY Key (Key 11) and the Cursor Keys (12 to 15). It is not recommended that Key 10,the BREAK Key, is defined. This means that fifteen keys containing up to a thousand characters are available. This is ideal for short statements. However it was found that more was required, but this snag was overcome by successively redefining the keys.

## BASIC Definitions

Keys may be defined by a BASIC program which permits sentences of over two hundred characters long or by an *EXEC file where line length is restricted to about sixty characters.Why bother with an *EXEC file? Well this has the advantage that it can be loaded from the Command Mode of View without returning to BASIC. This latter procedure can be hazardous, risking lost data.

The Solution then was to use a !BOOT File to load the first "Keys" program which is written in BASIC, and is the "meaty" one; then to call up *VIEW* and the Printer Driver, and finally to load the main screen which controls the format of the profile. An example is given in Figure 1. The SEARCH command switches to the Edit Mode and places the cursor next to where the student's name is to be entered. A series of *EXEC files are also made available, and an example is given in Figure 2.In all key definition files Key 9 contains a definition such as:
"*KEY9*FX225,0 M*EXEC ZPASTOR M". The first call permits the existing key definitions to be overwritten,and avoids the "KEY IN USE" error. The second loads in the next file. This key is used from the Command Mode of *VIEW* and does not need CTRL/SHIFT (*EXEC files can be prepared in *VIEW* or the EDITOR). Should a generally useful definition be given by the first BASIC file, say the COPY key contains a page wide row of asterisks, this will stay operative throughout provided the key is not redefined or CTRL/BREAK is pressed(A possible "format" or header screen is shown in Figure 3).

Use of the Program amounts to:

**1.** SHIFT/BREAK, enter the Form Name and Date; ESCAPE switches to the Command Mode and then SAVE,RETURN.
**2.** SHIFT/BREAK, enter Student's name, press RETURN until the "$" sign is reached.
**3.** CTRL/SHIFT and the appropriate keys so entering the data.
**4.** ESCAPE to get the Command Mode,and then KEY 9, for the next file. ESCAPE again and carry on entering.
**5.** When complete, again ESCAPE and then P RETURN to print out the Profile on tractor fed paper giving a master and two carbons.
**6.** If the printer used has a reasonable buffer,

```
The !BOOT file is:
*BASIC
CH."BASIC KEY
DEFINITIONS"
MODE3
*WORD
NEW
PRINTER NL1O
LOAD HEADER SCREEN
SEARCH :
```

```
A typical *EXEC file is shown below:

*FX228,1
 ATTITUDE AND EFFORT.
*KEY0ATTITUDE TO WORK.¦M¦MKeen and conscientious.¦M¦M
*KEY1ATTITUDE TO WORK.¦M¦MLimited concentration span.¦M¦M
*KEY2ATTITUDE TO WORK.¦M¦MDisruptive.¦M¦M
*K.3CO-OPERATION WITH OTHERS.¦M¦MInvolved takes the lead.¦M¦M
*K.4CO-OPERATION WITH OTHERS.¦M¦MPassive,follows others.¦M¦M
*KEY5CO-OPERATION WITH OTHERS.¦M¦MWants to work alone.¦M¦M
*KEY6PRESENTATION OF WORK.¦M¦MThorough and painstaking.¦M¦M
*KEY7PRESENTATION OF WORK.¦M¦MAdequate.¦M¦M
*KEY8PRESENTATION OF WORK.¦M¦MMuch room for improvement.¦M¦M
*KEY9*FX225,0¦M*EXEC ZOBSERV¦M
Note:¦M performs a RETURN;*KEY can be shortened to *K.
```

work may continue immediately on the next Profile while the first is being printed out.

Using this system it is possible to enter an A4 sized profile in less then a minute without any rushing.

So we have no relational Database, no "Reading" in of *VIEWSHEET* files, no six by eight Arrays. What we do have is a special type-writer with which a one fingered typist can produce a professionally laid page of error free typing, together with two carbons. And all this in a minute or so. *VIEW's* facilities are in no way diminished, so a personalised note can be added wherever required.

Perhaps there is something in this computing business after all!

```
TM0
HM0
                    -B A G W A S H   A C A D E M Y.-

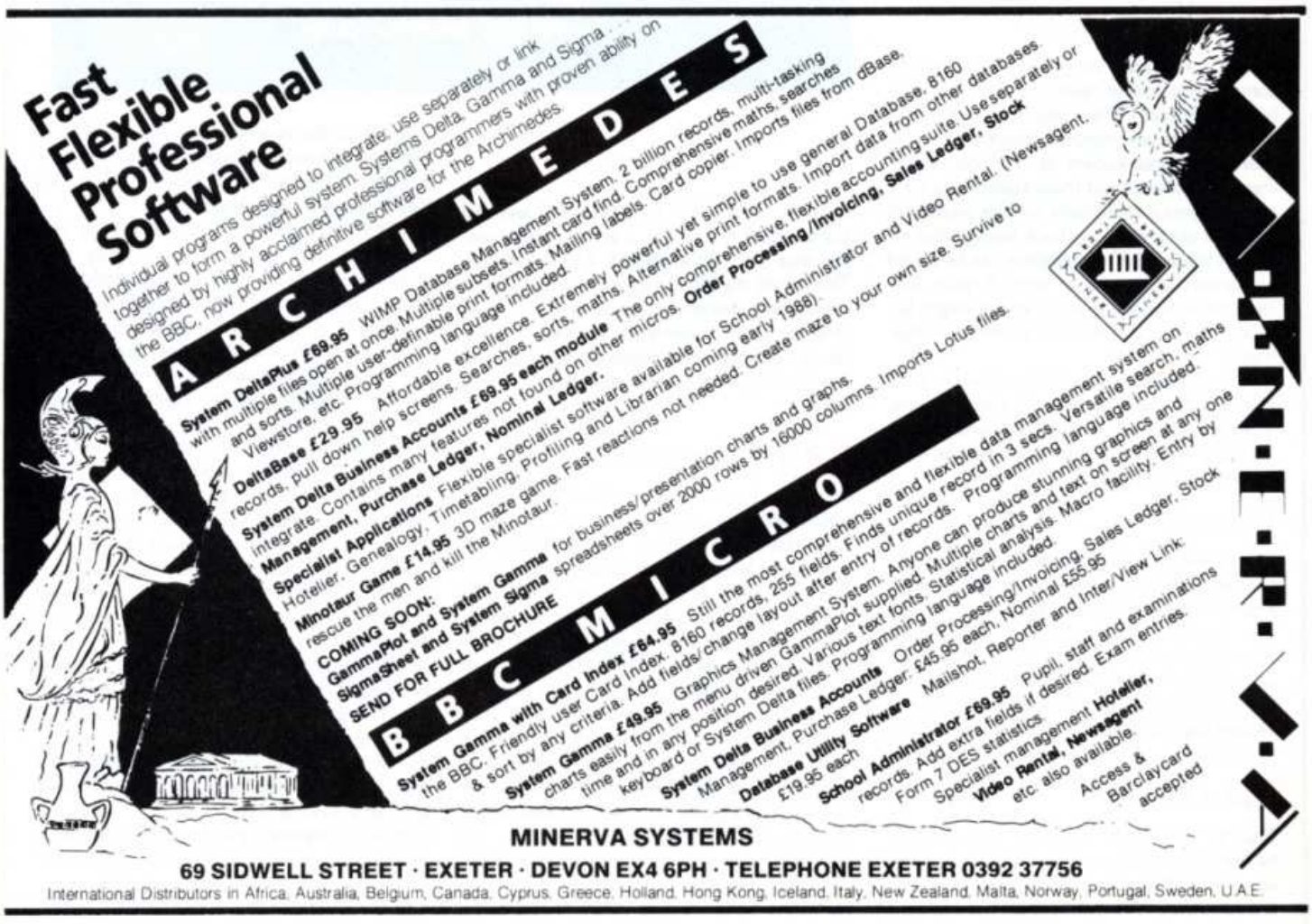
CE Name of Student:
CE Form:

  -SCIENCE ASSESSMENT-        Signature of Teacher.....

RJ Date:
   LABORATORY SKILLS.

   $

                          A possible HEADER SCREEN.
```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Jonathan Evans



# SYSTEM GAMMA

**System Gamma, from Minerva Systems, is a 32K ROM for creating graphical displays from numerical data**

System Gamma follows a similar approach to the System Delta database management system which I have discussed in detail in two recent articles in the magazine. That is to say, the ROM itself provides a number of * commands which provide machine code routines for high level functions, but the user interface must be written in BBC BASIC. As with System Gamma, you may use the interface provided, or else purchase a copy of the optional *programmers reference guide* so that you can write your own BASIC routines incorporating the additional commands.

Unlike System Gamma, however, Delta is not immediately available to all BBC owners since it requires use of both the GXR commands and shadow RAM for the screen. Hence, it is compatible with the Master 128 and Compact, the B+ with GXR ROM fitted, or a Model B with both a shadow RAM and GXR upgrade. I believe that Minerva are negotiating with Acorn to be able to provide an inexpensive GXR ROM for purchasers of the system. The system is supplied in 32K (double decker) ROM format and DFS format disc in five and quarter inch version. However, the latter is not protected and the files may easily be transferred to an ADFS disc if preferred.

System Gamma allows three levels of access to the system of decreasing friendliness but increasing power. I will consider each in turn, plus the ability to link the program with System Delta databases and other software.

## The standard interface

The main program, "PLOT", which you will normally enter from the boot up screen presents the menu shown in Figure 1. To

Macro commands in System Gamma

(1) Documented Macro commands (arguments not shown)

| | |
|---|---|
| AXIS | Draw axis without graph |
| BARS | For creation of mutiple bar chart displays |
| BESTFIT | Plots line of best fit |
| CHOOSE | Sets default graph |
| DATA | Input new data to defined graph |
| DEFINE | Define new graph name |
| FONT | Select text font for next display |
| GO | GOTO line number in Macro |
| GRAPH | Specify graph type |
| GWIN | Define graphics window (equivalent to VDU 24) |
| HIST | Plot histogram |
| HIST3D | Plot 3D histogram |
| IF .. GO | Control structure for Macros |
| LABELS | Switch label display on/off |
| LINE | Plot line graph |
| LOAD | Load graph data from file |
| OUTLINE | Switch outlines or pie-charts and histograms on/off |
| PERCENT | Switch percentage display on/off |
| PIE | Displays pie graph |
| RECTANGLE | Draw rectangle with optional fill |
| SAVE | Save graph data to file |
| SCATTER | Plot scatter graph |
| TEXT | Prints text on screen in specified position |
| VALUES | Switch printing of numeric values on/off |
| WAIT | Holds display and waits for key press |
| WINDOW | Define System Gamma view window |
| XSCALE | Sets range of X-axis |
| YSCALE | Sets range of Y-axis |

(2) Undocumented Macro commands

Equivalents of *SG commands not given above, including:

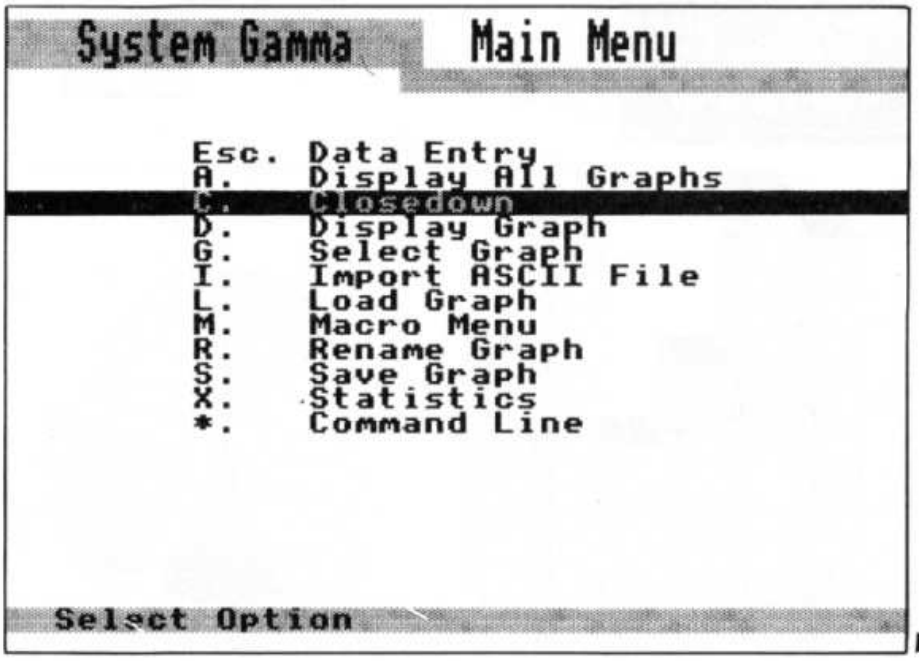
| | |
|---|---|
| DUMP | Dumps screen to printer |
| SCNSAVE <filename> | Saves screen as a file |

(3) Additional commands equivalent to those in BBC BASIC

CLG, CLS, DRAW, GCOL, MODE, MOVE, PLOT, VDU

**Table 1.**

**Figure 1.**



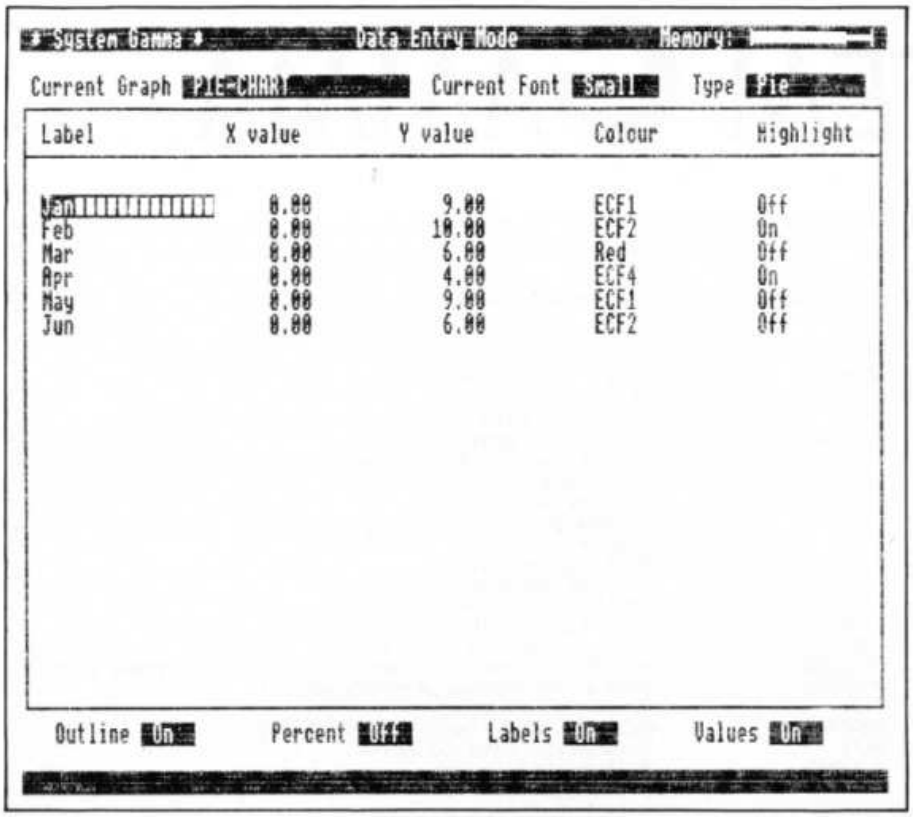
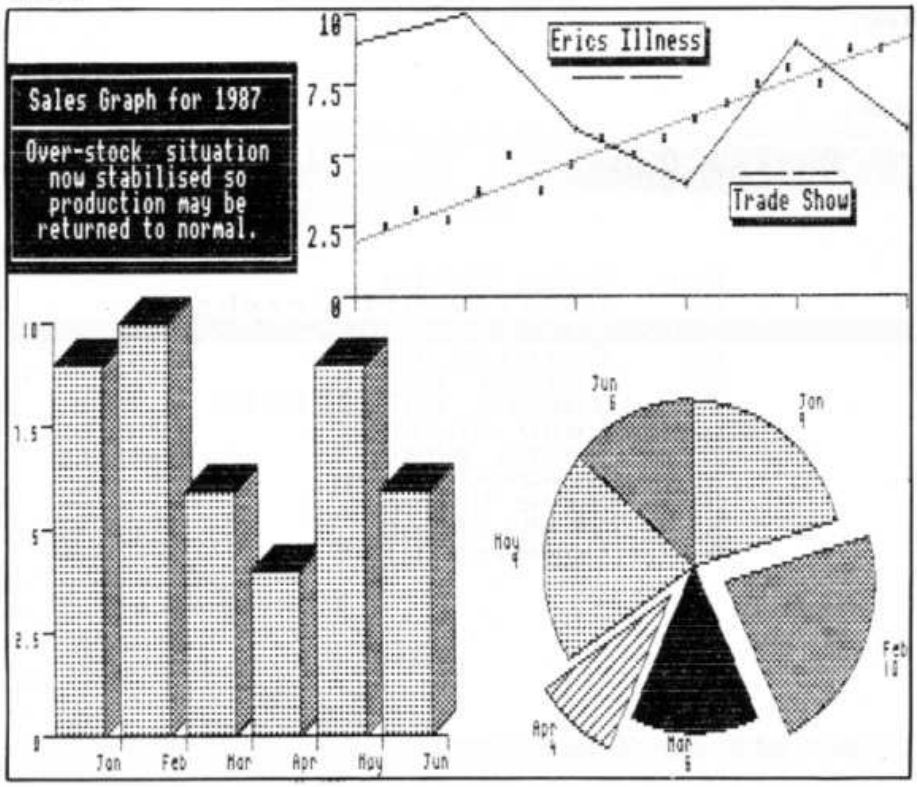



**Figure 2.**

display a graph, the system must first have some data which may be typed in directly, loaded from a previously saved file or imported from an ASCII file. To enter data via the keyboard you press Escape which takes you to the 80 column screen shown in Figure 2. The data are entered within a central box which can be scrolled as necessary for large data sets. You may enter a label, X and Y value for each point, though normally only one of the first two would be appropriate. Entry and editing of data is straightforward and well documented.

In *Data Entry* mode, the various display options shown around the box can be set by control-key presses. There are three font types: Normal, Thin and Small and five graph display types: Scatter, Line, Histogram, Pie and Histogram 3D. In addition, there are options for the presence or absence of outlines (on bar and pie charts), labels and values (if on in raw or percentage form) and for colours and highlighting in displays. All options have sensible defaults and some apply only to certain types of display. The screen dump shown in Figure 3 (from a supplied macro – see below) illustrates three graph display types: line graph in the top right (with optional best fit line), 3D bar chart and pie chart (with optionally highlighted segments).

**Figure 3.**




## All the options

Like Inter-Chart (Computer Concepts' 16K graphs and charts ROM) the program can keep track of a number of different data sets (graphs) in memory which can be selected one at at time for processing. Rather irritatingly – and unlike Inter-Chart – the system requires you to save each of these graphs as a separate data file. When displaying the graphs you may either display the currently selected graph (option D on the Main Menu) or else all graphs for which data is currently held in memory (option A). I will consider the individual case first.

When option D is taken your graph is displayed in according to the values of the variables discussed above on the Data Entry screen. In this interface Mode 1 is always used (with ECF (extended colour fill) as well as pure colours available) and you must use macros, discussed below, if you wish to display in another screen Mode. There are, however, a number of controls available while viewing the graph display.

My favourite of these is the window option which sets a view window for that particular graph. On pressing W a rectangle appears on the screen corresponding to the current window. By a combination of Shift, Control and Cursor keys this can be 'rubber banded' to any size, shape and location. On pressing Return the new window is fixed and the graph redrawn (and automatically re-scaled) to fit within it.

The other options are B which plots a line of best fit, C which dumps the screen on an Epson compatible printer and S which saves the screen to a specified filename. This is necessary for use of the customising option discussed below. The W and B options are remembered when the file is saved so that it will reload with the display characteristics that you set.

Option A simply superimposes the display of all active graphs on the same screen. However, because each graph can have its view window set separately, they can be arranged so as not to overlap each other, as in Figure 3. Very nice. Such screens can again be dumped or saved. What one cannot do in either display mode, however, is to add text and labels beyond those placed on the axes for you. In order to do this you must first save a *screen*, ie not just the data file needed to generate a screen and then quit the program.

Annoyingly, no menu option is provided for CHAINing the customise program. You

must either re-boot the disc or type CHAIN ":0.CUSTOM" to load the customising program. You then press L to load your screen by entering its file name. You can then place text labels wherever desired on the display. In addition to the three fonts, you can also specify the text to be contained in a box, with or without an accompanying shadow. After labelling, the revised display can be saved again as a screen or dumped to printer. If your printer is not Epson compatible you will need to save the screen and then load and dump it with your own routine outside of System Gamma.

## Graph grappling

I ran into problems initially in producing graphs such as those shown in Figure 5. Why I wanted to draw this particular graph is obscure and irrelevant, but it illustrates a general problem. Scientific applications often require – as in this case – the superimposition of several line graphs on the same set of axes. If you attempt this via the standard interface – using the display all graphs option – you can run into problems since the axis labels are autoscaled and may differ between graphs causing a messy overlap. However, if you switch off the 'values' option on all except one of the graphs to be overlayed then you get the desired result. Figure 5 was subsequently customised using alternative fonts, boxes and shadows.

A final option on the standard interface, available from the main menu (Figure 1) allows you to display statistics on your data set and optionally send them to the printer. A dump of a sample screen is shown in Figure 4.

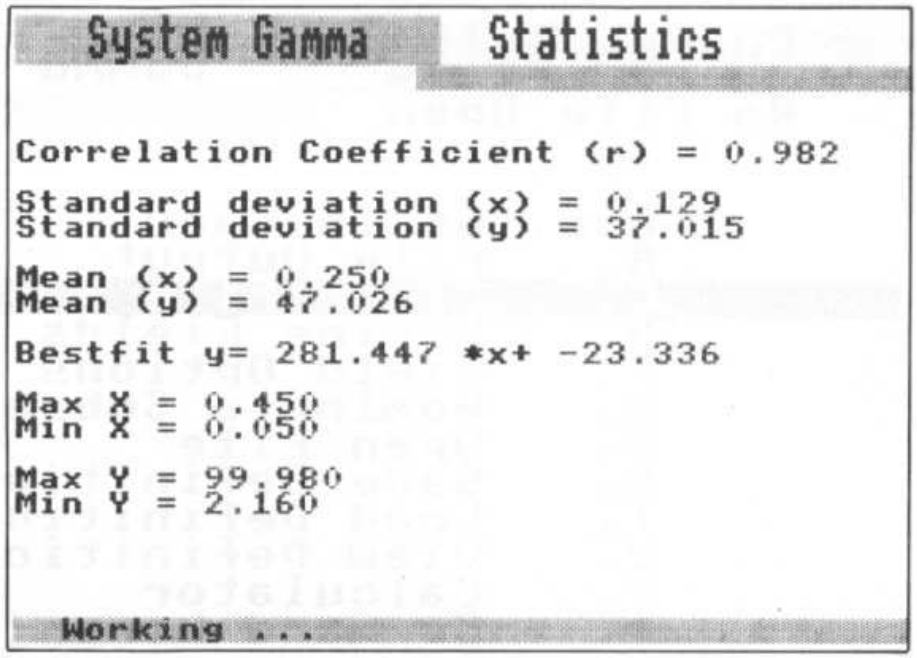

System Gamma Statistics
Correlation Coefficient (r) = 0.982
Standard deviation (x) = 0.129
Standard deviation (y) = 37.015
Mean (x) = 0.250
Mean (y) = 47.026
Bestfit y= 281.447 *x+ -23.336
Max X = 0.450
Min X = 0.050
Max Y = 99.980
Min Y = 2.160
Working ...

Figure 4.

## Programming via macros and BASIC

The standard interface, described above, is quite powerful and easy to use but by no means exploits the full power of the system. Further facilities are available to you if you are willing to write simple programs within the System Gamma environment called 'macros'. Option M from the main menu takes you to a simply macro menu from which you may edit, save, load or run macros. Edit mode – reached by Escape from the macro menu – is a Mode 7 screen on which macro commands can be entered and edited in a straightforward manner. The main macro commands are shown in Table 1 (1). All of these take arguments (eg graph names, file names) which are not shown in the Table but are fully documented. I was astonished by some apparent omissions – eg to dump or save the screen – but discovered by experiment (and conversation with Minerva) – that they are present but not documented.

For example, Figure 3 is a screen display set up by a demonstration macro and thus able to access the greater resolution of Mode 0 for this rather complex display of three graph files. However, all the supplied graph does is to sit there for you to look at it. I tried adding DUMP (undocumented) to the end of the macro and – presto! – Figure 3.

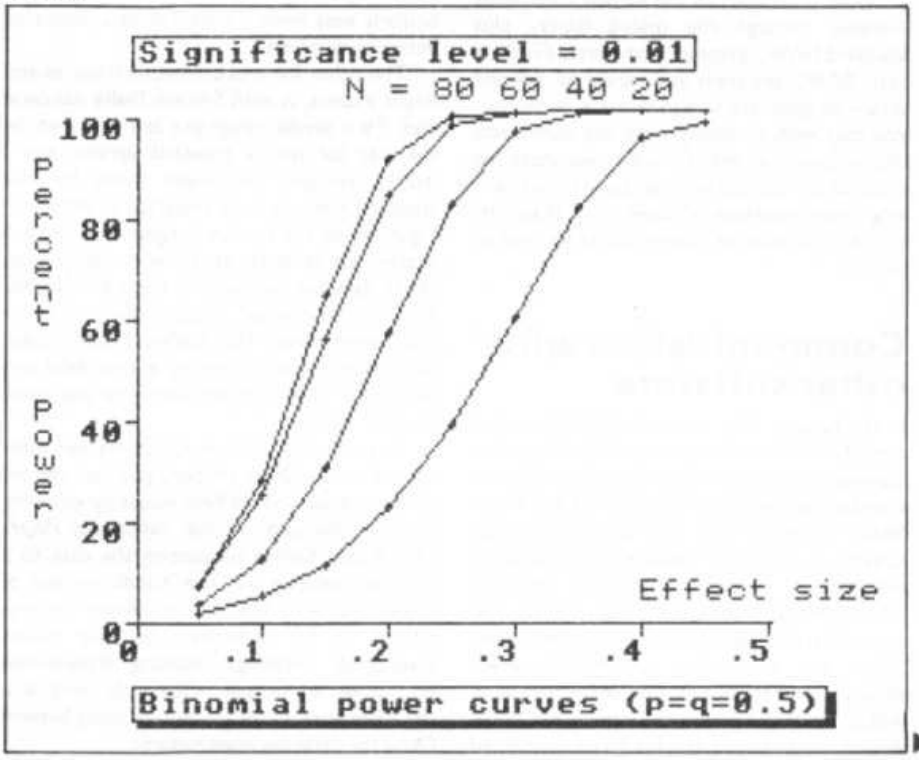
Similarly, SCNSAVE <filename> will save whatever your macro produced to a file.

The macro commands appear simply to call equivalent 'raw' *SG commands in the ROM, so I suspect there are a number of other undocumented ones (having seen the draft programmers manual). A handy one might be PIXEL which allows you to define the character used to plot each point on scatter and line graphs, in a similar manner to VDU23 for user defined characters (except that only seven 8 bit numbers are allowed).

I am quite baffled as to why Minerva should provide facilities which are not documented. It certainly doesn't seem very reasonable to me to expect people to buy the programmer's reference manual simply to have a full list of equivalent macros. Another irritation is that there is apparently no facility for listing a macro on the printer. However, it must be said that the macro facility is ingenious and powerful.

As with System Delta, you may choose to access Gamma commands directly from your own BASIC programs. I received a draft copy of the Reference Manual shortly before the review deadline and have not written any routines of my own as I did for System Delta (see my article in the February '88 issue of A&B). However, it is very similar in principle, ▶

Figure 5.



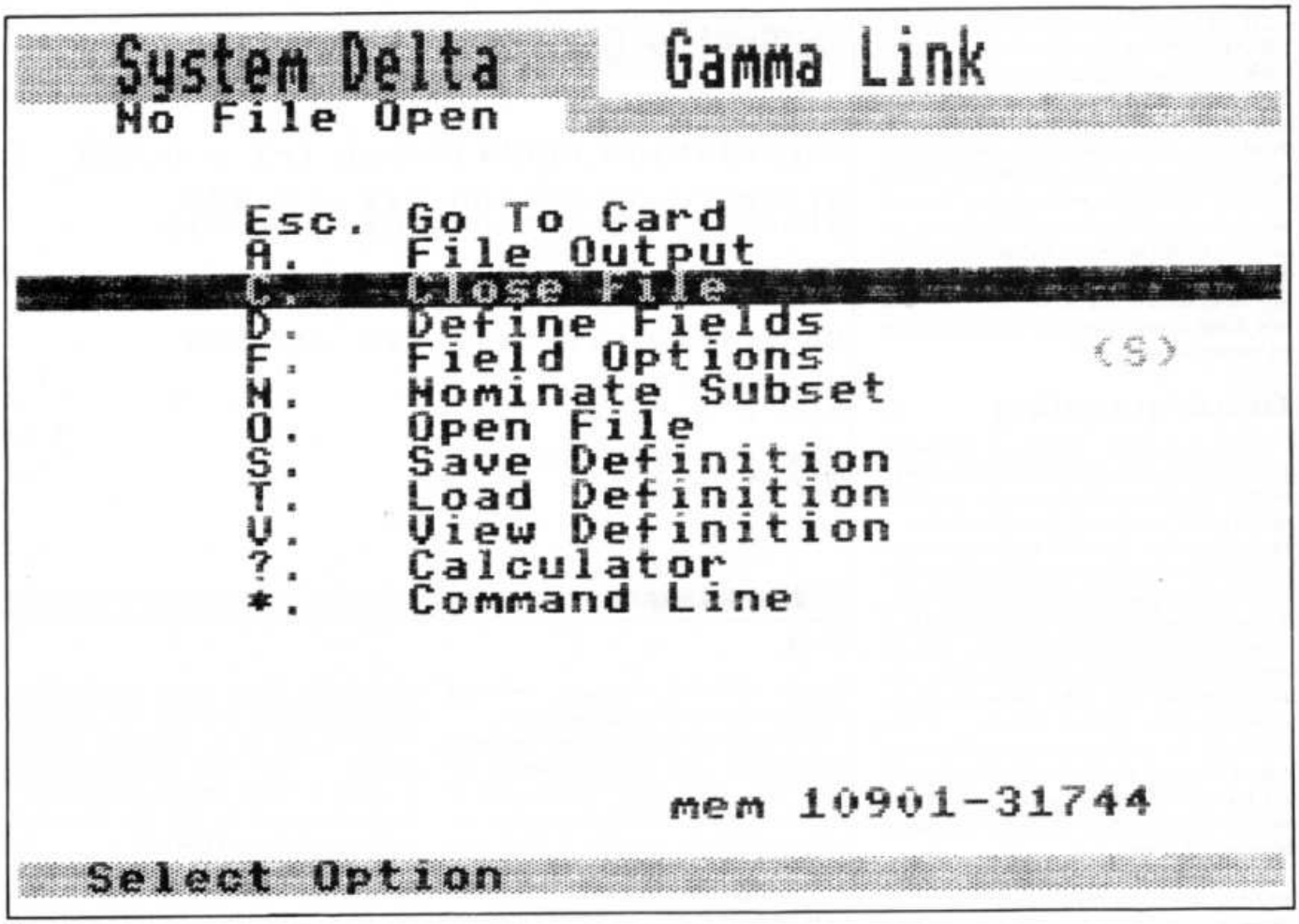



**Figure 6.**

with high level commands called by *SG followed either by a name suffix (eg *SGscatter) or a number for more obscure and low level commands.

With (I assume) all the named commands available through the macro facility plus standard BASIC graphics commands (Table 1 (3)), BASIC program will rarely be needed simply to generate screen displays. However, you may wish to incorporate the commands into software written for other purposes (eg a statistical calculation package) or write a specialised interface of some kind. If so, the system is as open as System Delta for you to do this.

## Communication with other software

In the January 1987 issue of A&B I discussed the ROM-link facility provided by Computer Concepts and particularly liked the ability to transfer data between Inter-Chart and Inter-Sheet in memory as well as through files. Obviously, this is not possible if you decide to use System Gamma as a more powerful alternative to Inter-Chart, but at least you can still access data from Inter-Sheet, View-Sheet and any other spreadsheet which allows you to spool a section of the data as an ASCII file. However, the import ASCII file option does require the file to be formatted in a particular way, so you may have to set your spreadsheet up accordingly or else edit the spooled file in a word processor before it can be read in. It appears to be set up to make importing data from Inter-Sheet particularly easy since it uses Tab as a separator between numbers.

The other form of communication, as you might expect, is with System Delta database files. Two similar programs are provided on the disc for this, a standard version and a 'totals' version. The main menu for the standard Gamma Link program is shown in Figure 6. As the header suggests it is really a System Delta program since it manipulates Delta database files to link them to Gamma. Files can be opened, subsets selected etc in the normal way. The Define Fields option then allows you to specify a text field and two value fields corresponding to the label, X and Y values.

In traditional System Delta manner (discussed in my earlier articles) you can extract processed versions of field values by including BASIC commands in the definitions (SQR, LEFT$ etc) before outputting the data to a Gamma readable file. The 'totals' version of Gamma Link is similar but allows computations to be performed on field values (averaging, totalling, counting frequencies etc) prior to output. Obviously, this is a strong feature if you are already using System Delta for database management.

## Conclusions

System Gamma has a few irritating deficiencies in the interface provided and the documentation (all easily correctable), but is basically a strong charts and graphs program. Compared with Inter-Chart it is more powerful, but less friendly. For example, Inter-Chart allows you to manipulate screens directly in all Modes and to customise screens without having to load another program (or any program, come to that!). On the other hand, System Gamma has the powerful windowing option, more display options and further facilities available through macro programming such as multiple bar chart displays. As with System Delta, I feel that programmers and more technically minded users will get the most out of the software and will benefit particularly if they are already using Minvera's database management system.

### Factfile

**System Gamma costs £49.95. Available from: Minerva Systems, 69 Sidwell Street, Exeter, Devon EX4 6PH. ☎ 0392 37756.**

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| Musician | DB06 | | | |
| Mode 7 Utilities | DB12 | | | |
| Adventurescape III | DB20 | DB28 | DB35 | |
| Combat Zone | DB21 | DB30 | DB32 | |
| Easy Font | DB26 | DB39 | DB44 | |
| ADFS Menu | | DB27 | DB31 | |
| Graphics pack 2 | DB29 | DB34 | DB38 | DE29 |
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| Pascal | DB70 | DB71 | DB72 | |
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| Skywatcher | DB79 | DB80 | DB81 | |
| Online! | DB82 | | | |
| Disk User One | DU1 | | | |

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| Name | Product | 40(small) | 80(large) | Price |
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| Compact 3.5" | DB33 | no | yes | £12.00 |
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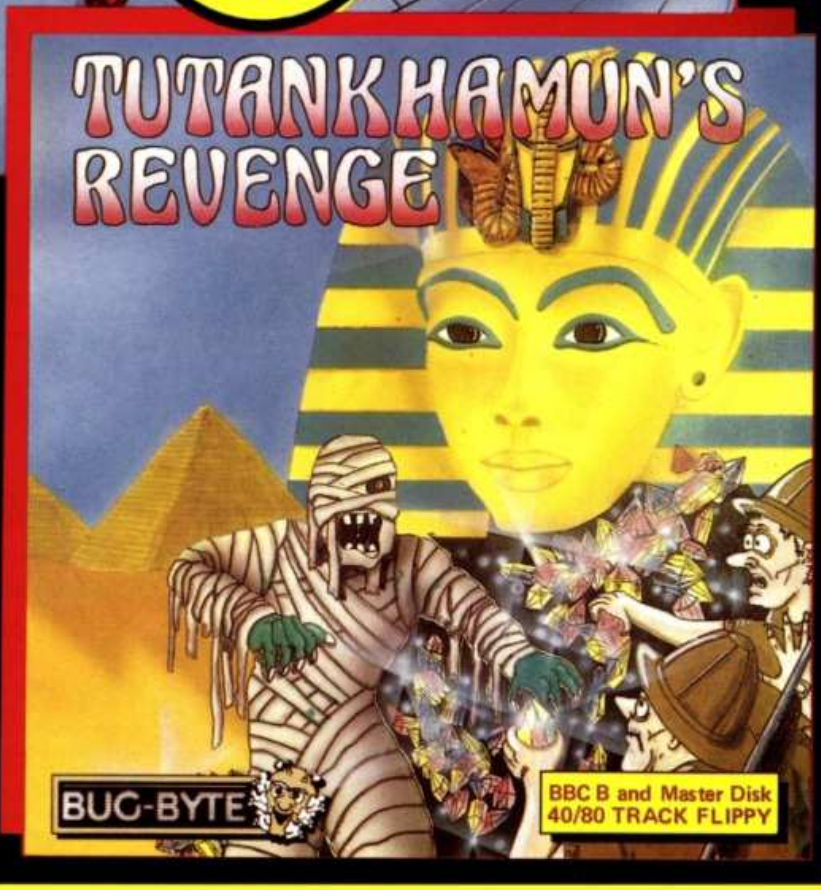


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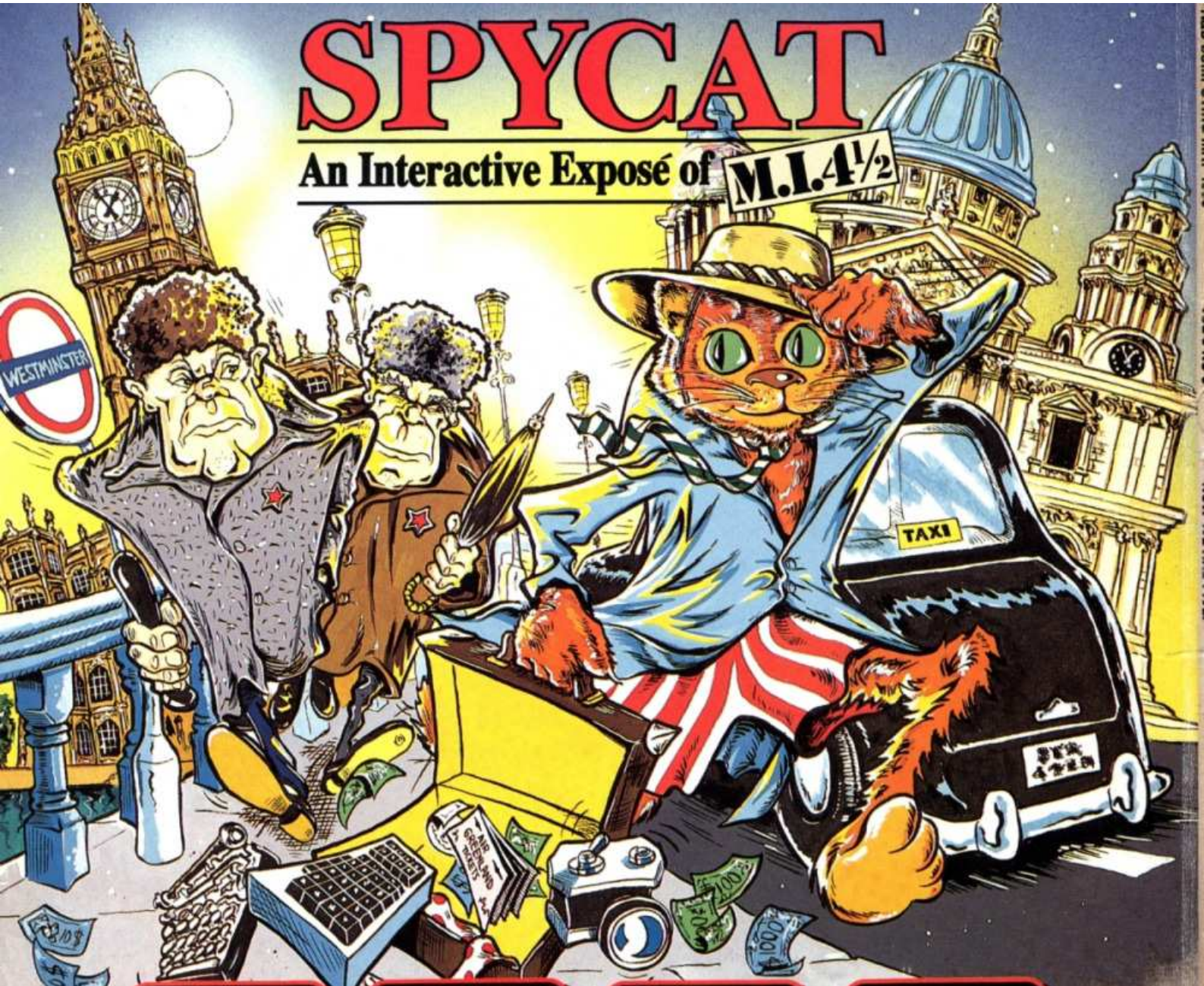

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